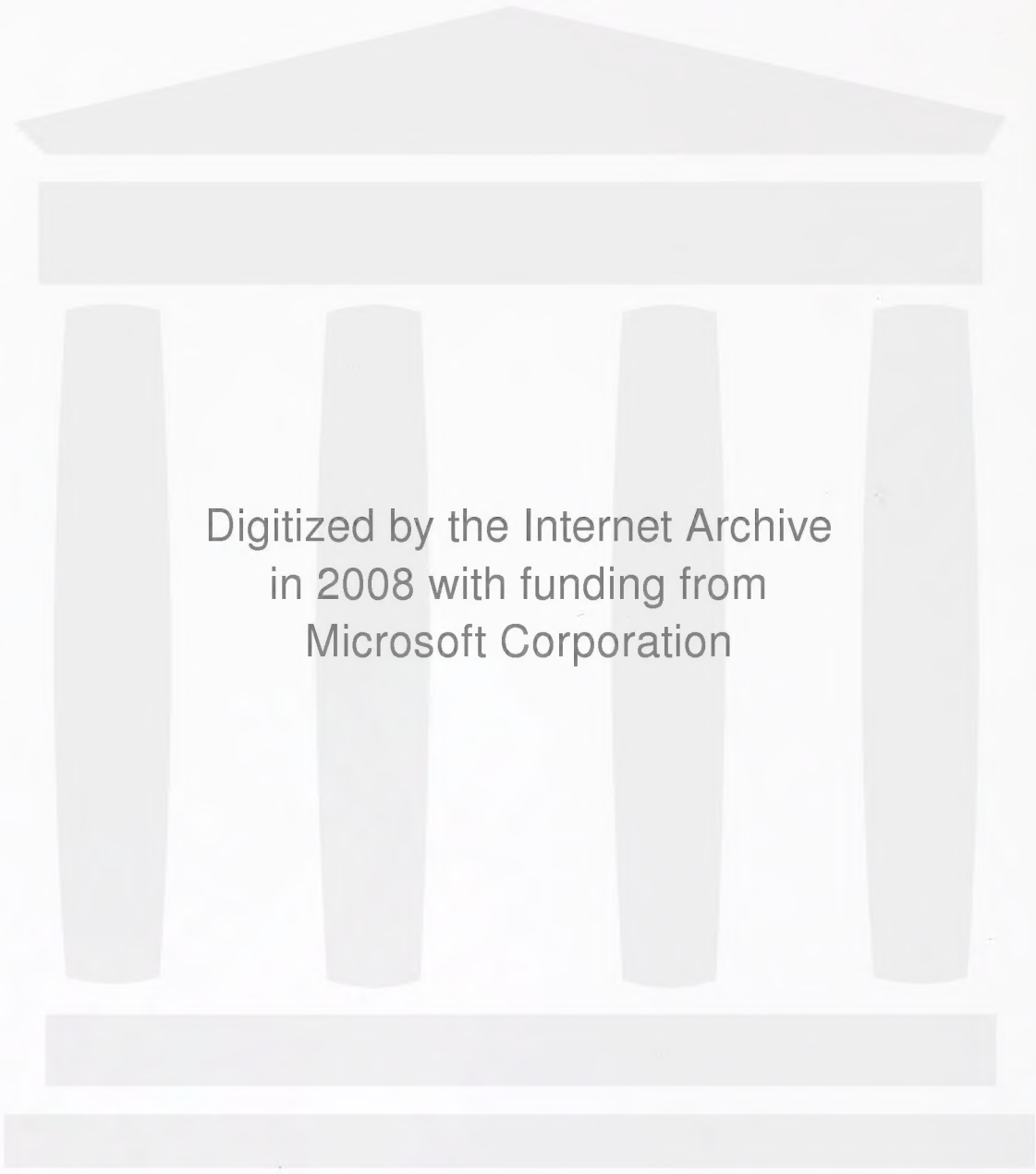

Digitized by the Internet Archive
in 2008 with funding from
Microsoft Corporation

http://www.archive.org/details/canadianmachiner2515torouoft

CANADIAN MACHINERY AND MANUFACTURING NEWS

Vol. XXV., No. 15 Published by the MacLean Publishing Company, Limited, Toronto April 14, 1921 $4.00 a Year Subscription Price

Library Faculty of Applied Science & Engineering University of Toronto

POSTAGE PAID

READ AND PASS TO	check	See Page	READ AND PASS TO	check	See Page	READ AND PASS TO	check	See Page
						RETURN TO..... ...	For	File

BUTTERFIELD

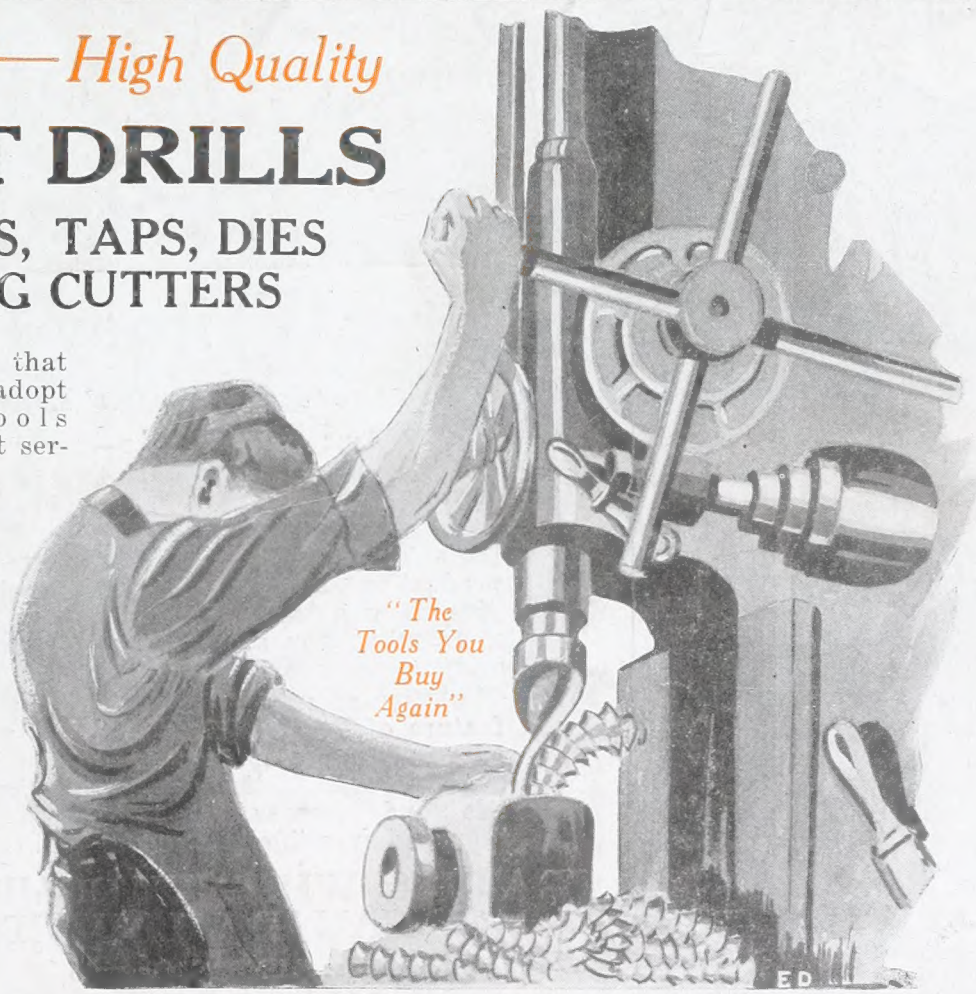
High Speed—High Quality

TWIST DRILLS

REAMERS, TAPS, DIES
MILLING CUTTERS

REST assured that when you adopt Butterfield Tools you are going to get service that results in the **utmost in economy, and the utmost in efficiency.**

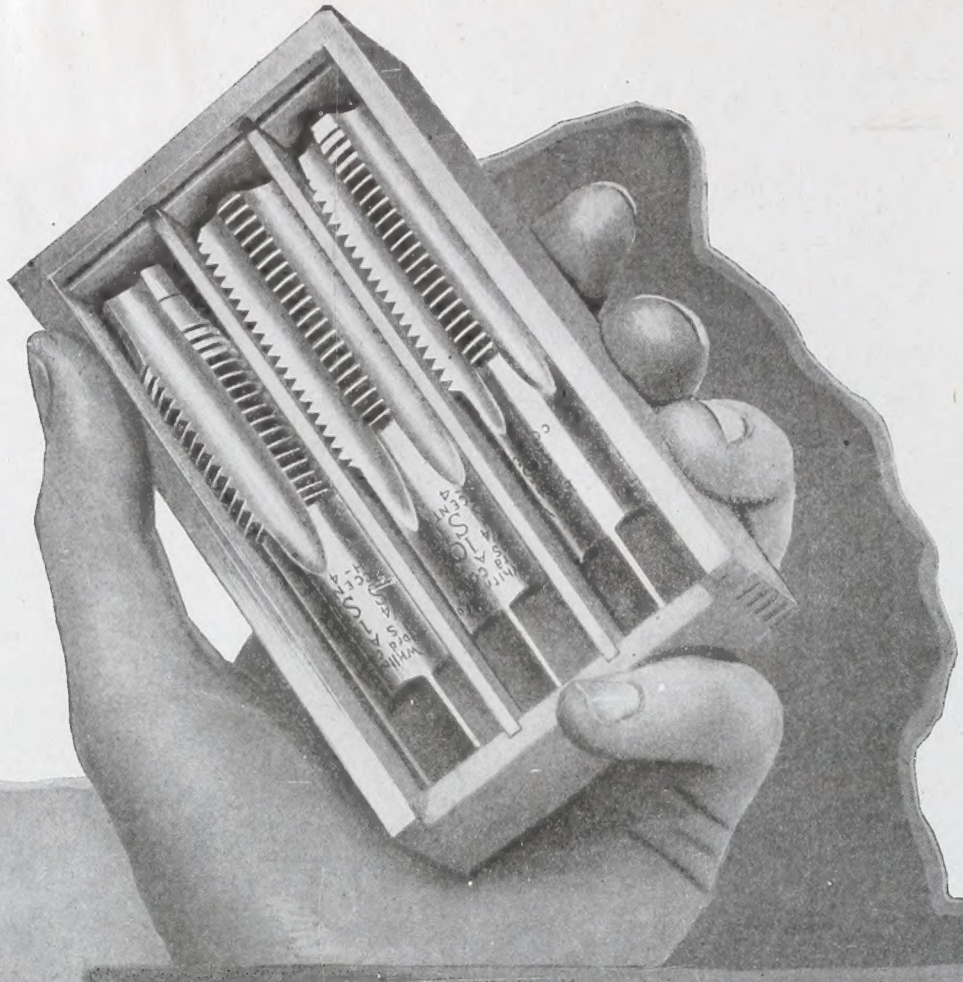
Butterfield Tools are made of the finest of pre-tested steel, are scientifically heat-treated and designed by engineers with a thorough understanding of present day requirements. They are "The Tools You Buy Again."



BUTTERFIELD & COMPANY, DIVISION
Union Twist Drill Co.
ROCK ISLAND, QUE., CANADA

STORES—220 King Street West, Toronto; 131 St. Paul Street West, Montreal.
AGENTS—D. Philip, 138 Portage Ave., Winnipeg, Man.; The Triangle Co., Standard Bank Bldg., Vancouver, B.C.

Foreign Representatives: Great Britain, Geo. H. Alexander, 83-84 Coleshill St., Birmingham, Eng.; France, Italy, Belgium and Switzerland, Fenwick Freres, 8 Rue de Rocroy, Paris; Sweden, Norway and Denmark, Ab. Sigfr. Anderson & Co., Malmo; Spain, Casamitjana Hermanos, Barcelona; Japan, Abe-Kobei & Co., Yokohama; Greece, Stephen G. Stephanson, 11 Lycourgan St., Athens; Netherlands, Wynmalen & Hausman, Rotterdam; Australia, H. R. Richardson, 82 Pitt St., Vickery's Chambers, Sydney; South America, Charles Dreyfus, B. Mitre, 785, Buenos Aires, R.A.; South Africa, H. Parker Wood, Cape Town, Durban and Johannesburg.



P & W

Pratt & Whitney Taps

"With the 'Con-eccentric' Land"

P & W Taps are **good** taps—easily the best where accuracy and high speed are essential. They cost more to buy, but less to use than others.

If you're doing work that calls for big production and for unusual precision, give them a trial. You'll be back for more when you see them prove themselves.

The "con-eccentric" land—the special feature of Pratt & Whitney Taps, permits sharpening on face of the cutting edge without affecting size. It lengthens life and assures accuracy hitherto thought impossible in a commercial tool.

PRATT & WHITNEY COMPANY OF CANADA, LIMITED

Works: DUNDAS, Ontario

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

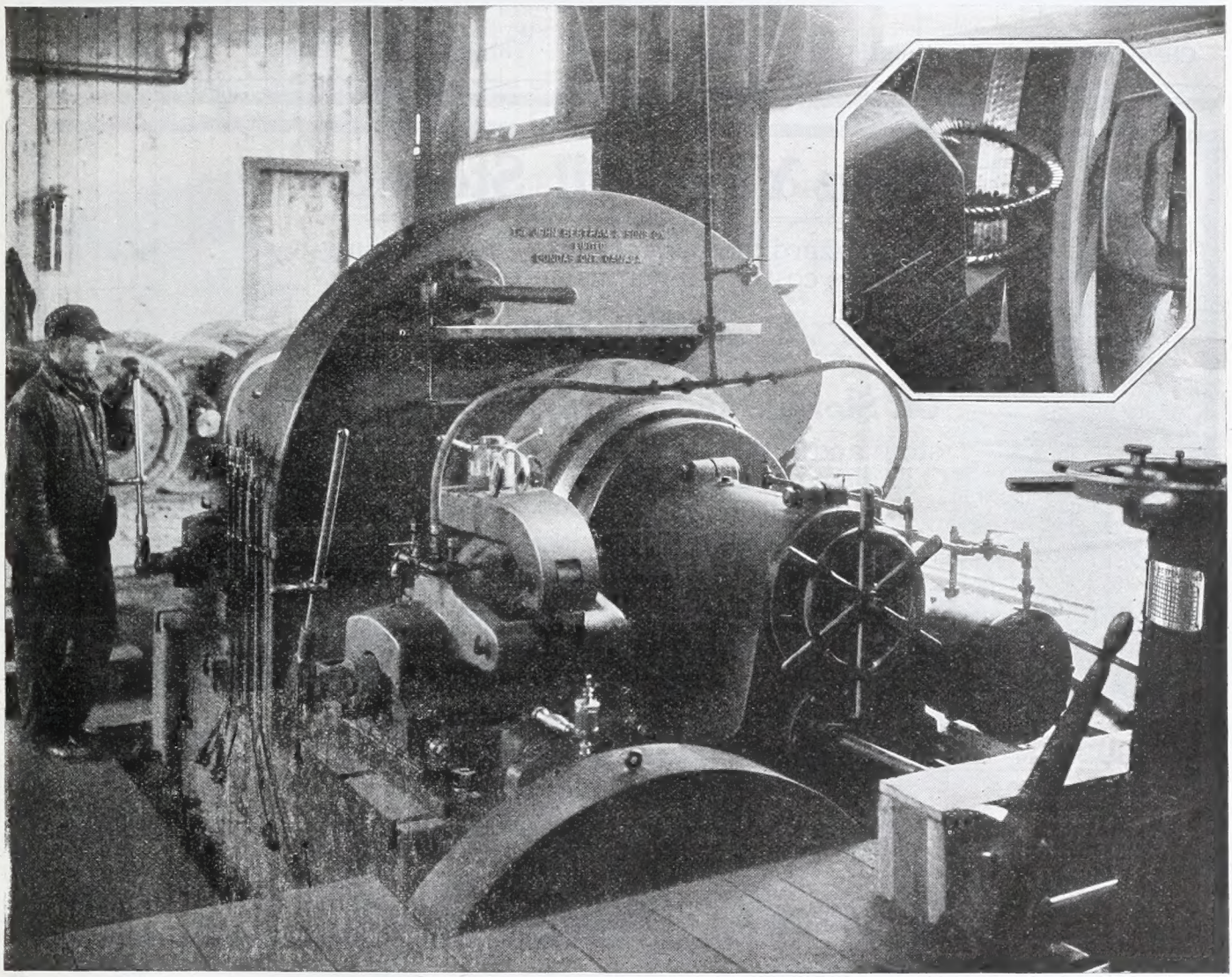
WINNIPEG
1205 McArthur Bldg.

HALIFAX
Roy Bldg.

VANCOUVER
B.C. Equipment Co.

WINDSOR: Davis Building

BERTRAM MACHINE TOOLS



Shop View of NO. 5 CAR WHEEL LATHE, a number of which we have recently furnished to Canadian Railways. (Inset—enlarged view of cut on wheel).

Note These Features—

Pneumatic Tool Clamps,
Movement and Clamping of Tailstocks, by Air Cylinders,
Automatic Gap in Driving Gear,
New all-steel Herring-bone and spur gear drive,
A.C. Motor Drive through Speed Box,
Hardened, ground and lapped shoes on Tool Slides,
Full magnetic lathe controller with "start," "stop" and "slow down" push button control stations,
Maximum Feed on Work 5/8" per revolution of wheel.

If interested, write us for photos and specifications.

The John Bertram & Sons Co., Limited

DUNDAS ONTARIO CANADA

MONTREAL 723 Drummond Bldg. | TORONTO 1002 C.P.R. Bldg. | VANCOUVER 609 Bank of Ottawa Bldg. | WINDSOR Davis Bldg. | WINNIPEG 1205 McArthur Bldg. | HALIFAX Roy Bldg.

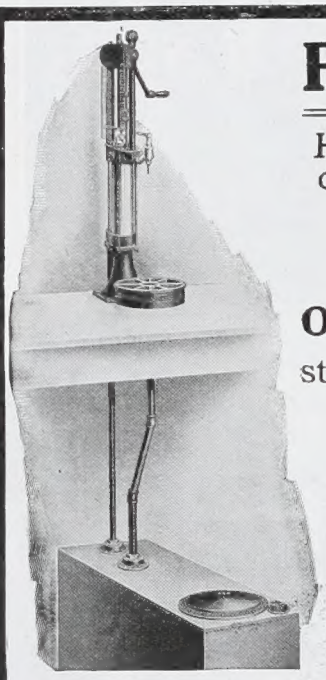
If interested tear out this page and place with letters to be answered.

HANNA

IRON ORE - PIG IRON

Sales Agents:

Cleveland Cincinnati Pittsburgh Toronto Buffalo Detroit



Plan Your Oil Storage

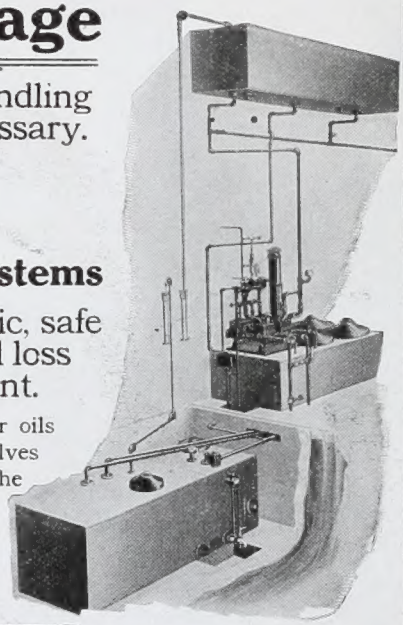
Haphazard methods of storing and handling oils are costly, dangerous and unnecessary.

BOWSER ESTABLISHED 1885

Oil Storage and Distributing Systems

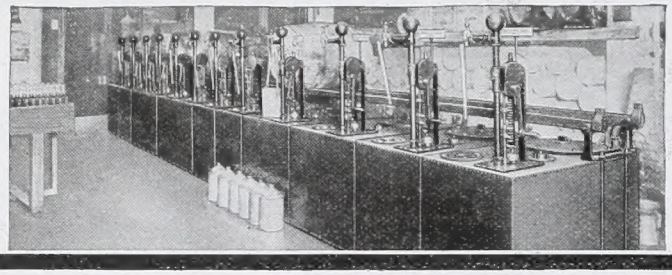
store and handle all oils in a systematic, safe and saving manner—they prevent all loss of oils—make every drop of oil count.

In factory, machine shop, power plant or wherever oils are used, BOWSER Storage Systems pay for themselves many times, through the saving in oils, besides the saving in labor and floor space.



S. F. Bowser Co., Ltd.

66-68 Fraser Ave., Toronto, Can.



BOWSER Oil Storage GIVES Convenience AND Safety

BOWSER Oil Storage IS Systematic AND Saving

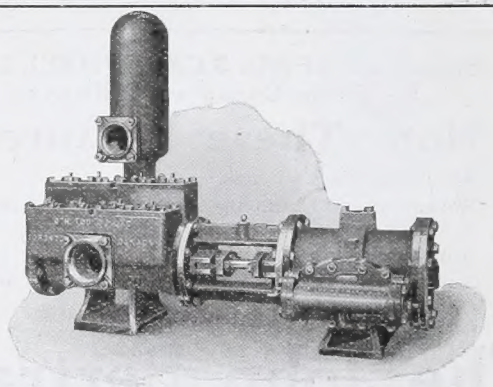
Hepburn Steam Pumps

Long Stroke Pumps for High Efficiency

The important thing about Hepburn Patent Pumps is the way they economize in steam. This is brought about by the long, regular strokes and the absence of water in the steam cylinder. Then there are no tappets or levers to get out of order; working parts are few, and the valves are very accessible.

In deciding on **your** pump then, let these features guide you. We assure you of long service with a minimum of attention from a Hepburn.

Hepburn Products include Vertical Engines, Compressors, Winches, Cut Gears, Derricks, Cranes, Power Presses, Hydrants, Valves, Blacksmith Work and Acetylene Welding.



JOHN T. HEPBURN, Limited ENGINEERS AND IRON FOUNDERS 18-60 Van Horne St., TORONTO, CANADA

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

NOVO-SUPERIOR

HIGH SPEED STEEL
INTRA STEEL GIBRALTAR STEEL
Tool Steel for Every Purpose
Swedish Lancashire Iron

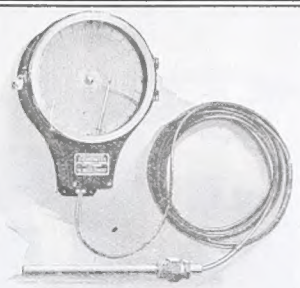
Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.; Music Wire for Springs, Steel Balls, Cold Rolled Tool Steel in Strips and Sheets, Circular Saws, Machine Knives.

PILOT STEEL & TOOL COMPANY, LIMITED
332 St. James Street, Montreal

Sole Agents for

JONAS & COLVER, LIMITED
Novo and Continental Steel Works
Sheffield, Eng.

H. BOKER & CO., Inc.
New York, N.Y.



"The Recording Instrument Idea"

is strongly fixed in the minds of thousands of manufacturing executives. They appreciate the value of keeping in touch with operating conditions, and knowing what transpires during their absence, by means of the chart records furnished by

TRADE MARK
BRISTOL'S
REG. U.S. PAT. OFFICE
RECORDING INSTRUMENTS

Yet, the more important function of "The Recorder" is for the workman who is responsible for the quality of the product. With a "Recorder" installed on the job he can tell at a glance just what conditions are now, what they have been, and in what direction they are leading. With this knowledge he can readily obtain close regulation—and even inexperienced workmen can do better work.

CONTROL THE QUALITY BY CONTROLLING CONDITIONS

Get copy of Bulletin I-303

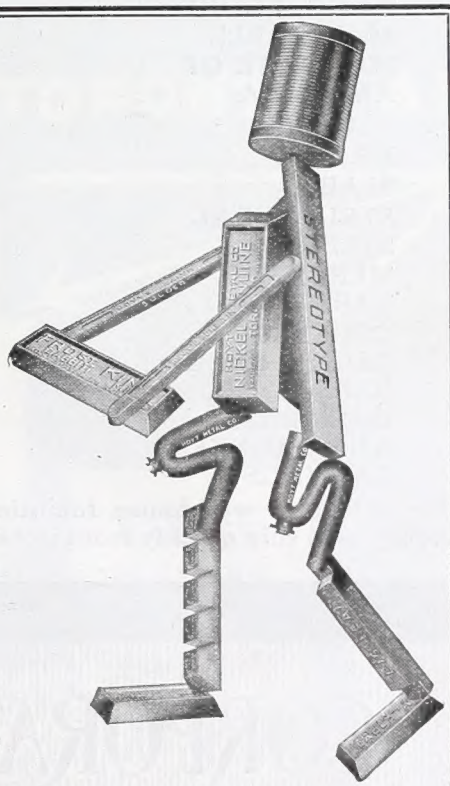
THE BRISTOL COMPANY
Waterbury, Conn.
Canadian Distributor: A. H. WINTER JOYNER, Toronto and Montreal

FROST KING BABBITT

will withstand heavy pressure without increasing its temperature.

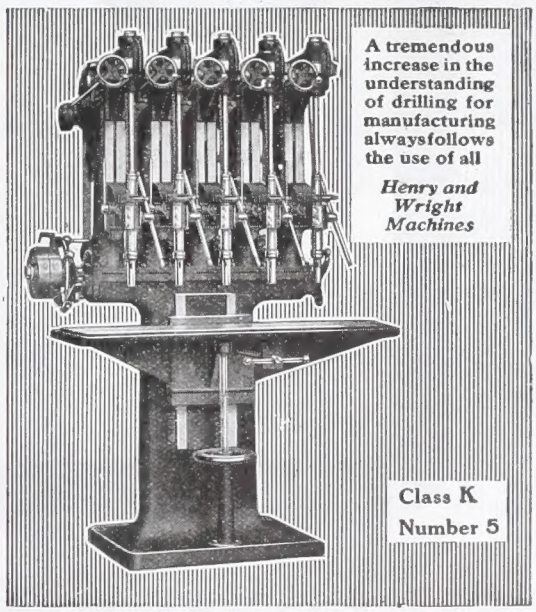
For general machinery bearings it is without a peer.

If you are from Missouri try a sample lot and be convinced.



HOYT METAL COMPANY
MONTREAL TORONTO WINNIPEG

HENRY & WRIGHT
Drilling Machines


A tremendous increase in the understanding of drilling for manufacturing always follows the use of all
Henry and Wright Machines
Class K
Number 5

The Henry & Wright Mfg. Co.
Hartford, Conn.
New York Office: 136 Cedar Street

Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg; A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W. Petrie, Ltd., Toronto; Williams & Wilson, Montreal; Rudel-Belnap Machinery Co, Montreal; Canada Machinery Corp., Galt, Ont.; Geo. F. Foss Machinery & Supply Co., Montreal; General Supply Co., Montreal.

If interested tear out this page and place with letters to be answered.

ALGOMA

Steel Products

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs. to 100 lbs. per yard)
SPLICE BARS
STEEL TIE PLATES
PIG IRON
BASIC, FOUNDRY
MALLEABLE
SULPHATE OF AMMONIA
BLOOMS
BILLETS
SLABS
STRUCTURAL STEEL
MERCHANT BARS
CONCRETE REINFORCING BARS
IRON, BRASS AND BRONZE CASTINGS

OPEN HEARTH ALLOY STEELS
CHROME-VANADIUM
CHROME-NICKEL
NICKEL
All of these steels we supply in
HOT ROLLED BARS
We also furnish in
BLOOM, BILLET AND SLAB FORM.

SULPHURIC ACID
NITRE CAKE

Our extensive warehouse facilities enable us to ship quickly from stock.

ALGOMA STEEL CORPORATION
LIMITED

SAULT STE. MARIE, ONTARIO, CANADA

Sales Offices: Montreal: 606 McGill Building. Toronto: Bank of Hamilton Building

H.W. PETRIE
LIMITED

MACHINERY
AND SUPPLIES

TORONTO AND HAMILTON

ENGINES
BOILERS
PUMPS
ELECTRIC
MOTORS
ETC.

LATHES
PLANERS
MILLERS
GRINDERS
ETC.

SHAPERS
BORING
MILLS
DRILL
PRESSES
PUNCHES
SHEARS
ETC.

BELTING
HANGERS
SHAFTING
PULLEYS
ETC.

WOOD
PLANERS
SHAPERS
MATCHERS
SAW TABLES
ETC.

If interested tear out this page and place with letters to be answered.

At Least One of the Elk Brands

FIRE BRICK

Is Especially Adapted to *YOUR* Needs

"Elkco," "Elkco Special," "Elk Steel"
"St. Marys," "Keystone," "M.D. Elk"
"Rotex," "Elk Dust," "Keystone Dust"
"Rotex Dust"

Each brand of Elk Fire Brick has some particular qualification which fits it to give better results in certain places than other brands we produce. And then there's the matter of **quality** and **price.** When you buy Elk Brands you get Brick of established quality; you also benefit by our service, which advises the most economical brand for your needs.

A trial will convince you. Large stocks of various shapes carried in warehouse in Hamilton.

ELK FIRE BRICK CO. OF CANADA
LIMITED
Sun Life Building, HAMILTON, ONTARIO

SMOOTH-ON ELASTIC CEMENT No3

Leaks Run Into Dollars

Stopping leaks in flanges and screw-thread joints is the easiest thing Smooth-On Iron Cement No. 3 does. Cracks in pipes, boilers, cylinders, valves—almost any power plant part—can be repaired easily and quickly.

Send for our new Smooth-On Instruction Book No. 18. It illustrates and describes many repairs actually made with Smooth-On Iron Cement. Most of these repairs being described by the Engineers who did the work. Many repairs are unusual, but most of the repairs might be needed in your power plant or boiler room any day.

May we send you a copy of Smooth-On Instruction Book No. 18? It's free, of course.

SMOOTH-ON MFG. COMPANY
JERSEY CITY, N.J., U.S.A.
Canadian Distributors: Canadian Asbestos Co.
Montreal Toronto Canada

248

Wear out Files —But not Men

It is easier and less expensive to replace files than men.

Keep your workmen supplied with sharp files and they will do their filing jobs well and remain contented.

Let them go on using a dull file, and you may save money on files, but you will lose it on labor and have discontented workmen and poor work.

Replace a dull file with one of the following standard brands:

Kearney & Foot
Great Western
American
Arcade
Globe

FILES

Made in Canada by

Nicholson File Company

Port Hope Ontario

MORROW TALKS

Service has always loomed large in the history of The John Morrow Screw & Nut Co., Ltd.

The company was founded on the idea and ideal of Service.

Many of the biggest plants in Canada have made Morrow Drills standard equipment.

Why?

Because the founder's dictum that "it pays to make the best" has actuated the Company throughout its career.

Your satisfaction is positively guaranteed with every drill. Order to-day by the name "Morrow."

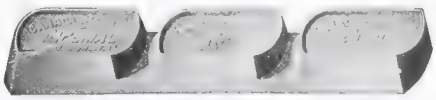
Try your jobber first.

THE JOHN MORROW SCREW & NUT CO.
LIMITED

Ingersoll, Canada

Montreal : 489 St. Paul St. West

WHY EXPERIMENT ?
WE DID IT FOR YOU YEARS AGO



IMPERIAL GENUINE

For Heavy Engines and Extraordinary Hard Work

HARRIS HEAVY PRESSURE

THE COPPER COATED CAKE

For Donkey Engines, Saw Carriages, Small Motors, Transmission Line Shafting and all steady heavy pressure duty.

Matchless

Suitable For Slow-Moving Bearings

Write For Prices

THE CANADA METAL CO., LIMITED
TORONTO HAMILTON MONTREAL
WINNIPEG VANCOUVER

LA SALLE

Has an Advantage Over Other Grinders

There is some outstanding feature of all La Salle Grinding Machines that lends it exceptional productive ability.
The American Drill Grinder is especially adaptable for grinding twist, flat and three-lipped drills, because it has automatic lip rest and caliper jaw device, which assures proper clearance on all sizes of drills automatically. Send for descriptive matter covering our entire line of grinding machinery.

American Drill Grinder
For Wet or Dry Drill Grinding 1/8" to 2¼". Also 1/8" to 3½" dia.

LA SALLE TOOL CO.
La Salle, Illinois, U.S.A.

Represented in Canada by

A. R. Williams Machinery Co., Ltd.
64-66 Front Street W., Toronto

Halifax St. John, N.B. Montreal Winnipeg Vancouver

If interested tear out this page and place with letters to boisers listed under proper heading.

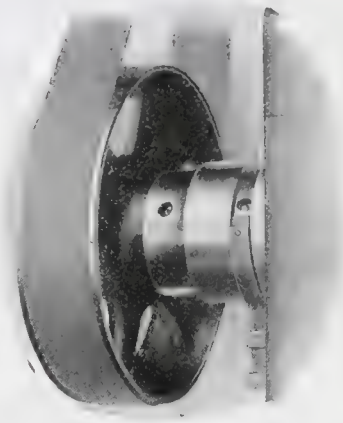
THE JOHNSON FRICTION CLUTCH

Put Johnson Clutches on Your Machines

The tight and loose pulley is passing from favor. With all its disadvantages, it long survived because a reliable friction clutch was not in evidence.

But in the Johnson Clutch, builders of high grade machinery have found a real clutch service. It has been thoroughly tested and adopted on the finest machines made.

Replace your tight and loose pulleys with Johnson Clutches.



Single Clutch with Pulley Mounted

Write for our Yellow Catalog and Booklet, "Clutches As Applied To Machine Building."

CANADIAN AGENTS:

WILLIAMS & WILSON, LTD., 84 Inspector St., Montreal

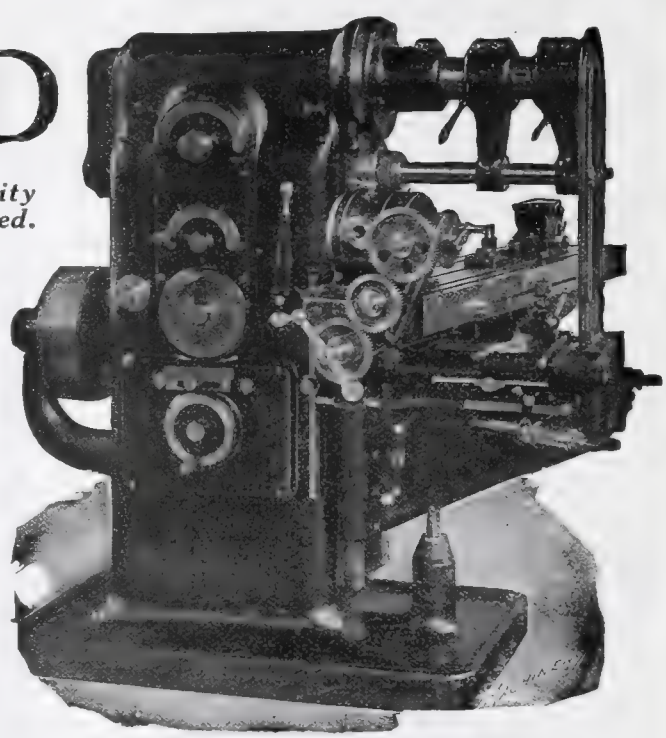
CANADIAN FAIRBANKS-MORSE CO., LIMITED, Montreal, Toronto, Winnipeg

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER, CONN.

Saves Time, Labor, Expedites Production

ROCKFORD Milling Machine

Its speed, simplicity of operation and great utility Assures Big Profits in whatever work it is used.



And another profit-making feature of the "Rockford" Miller lies in its unusual capacity to do all classes of work.

In the tool room, in the shop, in the manufacturing or jobbing establishment this "Miller" is beyond comparison.

Has Power to Spare

Put the power of the "Rockford" to the severest tests. It's built to more than meet the demands likely to be made upon it. It is the pace-maker of the machine shop.

Look into the merits of this machine. Write to us without delay.

ROCKFORD MILLING MACHINE COMPANY, ROCKFORD, ILL.

Canada: Rudel-Belnap Machinery Co., Toronto, Ontario.

FOREIGN REPRESENTATIVES: Great Britain, A. A. Jones & Shipman, Ltd., Leicester, England. France and Belgium, Louis Besse, Paris, France. Italy and Colonies, Societa Anonima Adler & Co., Milano. Scandinavia, Rylander & Asplund, Stockholm, Sweden. Spain and Portugal, Casamitjana Hermanos, Barcelona, Spain. Australia, Selson Engineering Co., Melbourne, Australia. Russia, M. Mett Engineering Co., Petrograd, Russia.

CANADIAN STEEL FOUNDRIES LIMITED

AMONG OUR PRODUCTS

O. H. STEEL
- Bolsters
- Couplers
- Draft Arms
- Locomotive Side Frames
- Machinery Castings
- Marine Castings
- Rolling Mill Rolls
- Wheel Centres

FERRO-ALLOYS

MANGANESE-STEEL
- Bucket Lips
- Crusher Jaws
- Dipper Teeth
- Mixer Teeth
- Special Trackwork

OTHER ALLOYS
- Crank Pins
- Crank Shafts
- Locomotive Frames
- Rolls
- Roll Shells

TRACKWORK
- Diamond Crossings
- Crosses
- Frogs
- Mates
- Switches
- Rail Braces
- Guard Rail Clamps
- Complete Intersection

This list is merely an indication

General Offices:
Transportation Building, Montreal

WE CAN SUPPLY

STEEL PLATE

—IN—

Universal Edge - up to 40 in. wide

Sheared Edge - up to 60 in. wide

Any Thickness **Any Lengths**

Send Us Your Enquiries.

Dominion Foundries & Steel, Limited
HAMILTON, ONTARIO

If interested tear out this page and place with letters to be answered.

CANADIAN ATLAS CRUCIBLE STEEL Co. LIMITED

Made in Canada

L-XX HIGH-SPEED
ATLAS TOOL STEELS
ATLAS ALLOY STEELS

Hot Rolled, Forged Blocks and Discs
Cold Drawn Steel and Drill Rod

GENERAL SALES OFFICE:
133 Eastern Avenue, TORONTO, ONT.
Works: WELLAND, ONT.
Sales Offices and Warehouses:
TORONTO, ONT. MONTREAL, QUE. WINNIPEG, MAN.

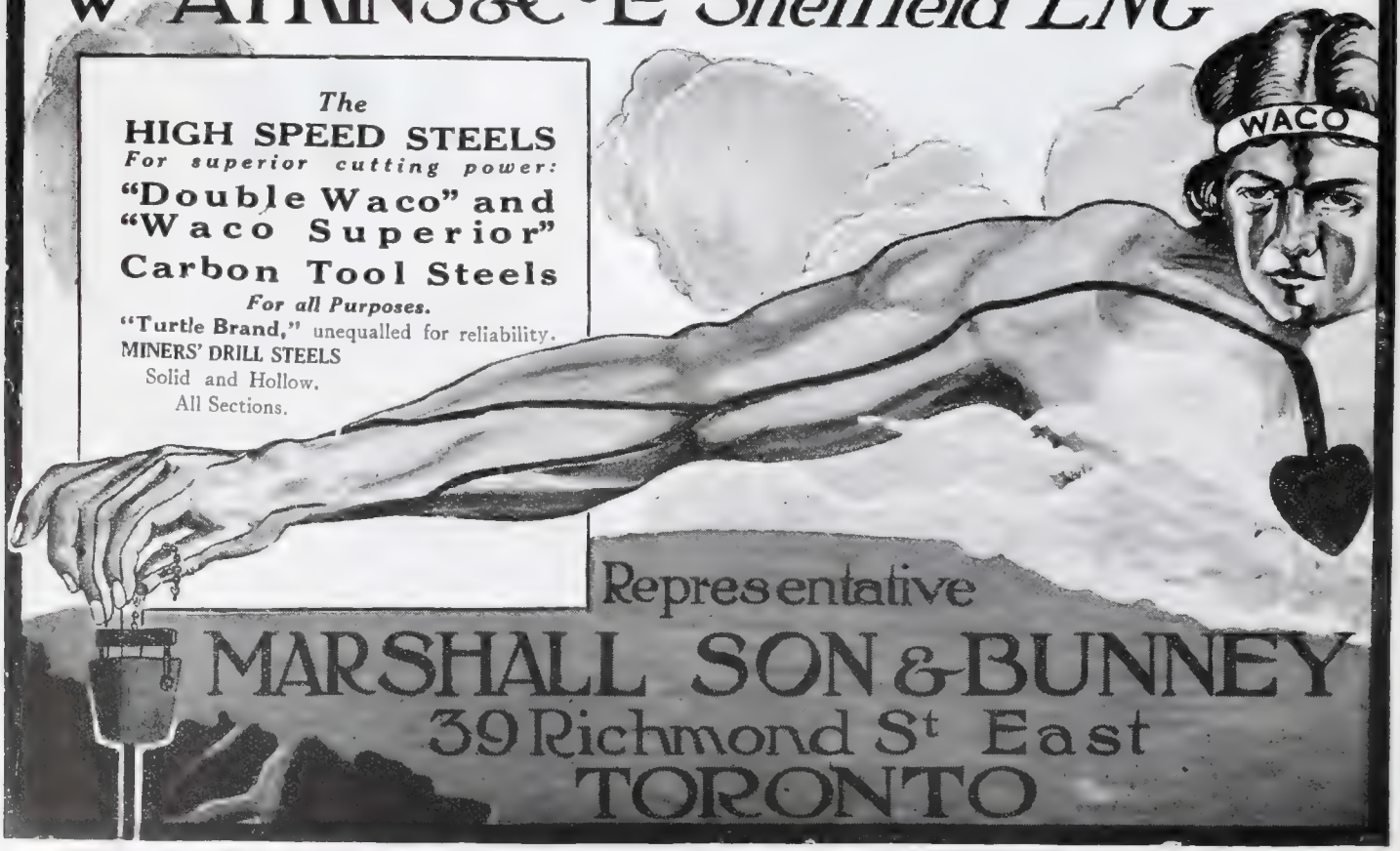
BEST BECAUSE
ALL STEEL HARDENED

Spindle, Nut and Screw made of Bar Steel. Body drop-forged. Long lasting under hardest use.
Write for free catalogue.

Armstrong Bros. Tool Co.
"The Tool Holder People"
335 N. Francisco Ave., Chicago, U. S. A.

W. ATKINS & Co Ld Sheffield ENG

The
HIGH SPEED STEELS
For superior cutting power:
"Double Waco" and "Waco Superior"
Carbon Tool Steels
For all Purposes.
"Turtle Brand," unequalled for reliability.
MINERS' DRILL STEELS
Solid and Hollow.
All Sections.



Representative
MARSHALL SON & BUNNEY
39 Richmond St East
TORONTO

REG TRADE MARK
TRAHERN
REG U.S. PAT OFF

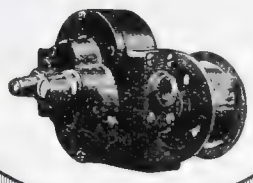
Coolant Pumps Are Superior

first, because the working principle is correct. They are Rotary Geared and this type has not been surpassed since it was first designed, in the sixteenth century.

They will pump water, oil, or compound in heavy streams without pulsation. No loss of prime. Reverse with machine, work against 100 lbs. pressure, supply up to 16½ G.P.M. Run at low speeds, giving long life.

We shall gladly send our illustrated booklet giving details.

TRAHERN PUMP DIV.
Geo. D. Roper Corporation
ROCKFORD, ILL., U.S.A.



STEEL CASTINGS

QUICK DELIVERIES

High Carbon Steel
Manganese Steel
Chrome Steel
Mild Steel

QUALITY GUARANTEED

Sizes—½ lb. to 5,000 lbs. each

THE WILLIAM KENNEDY & SONS,
LIMITED
OWEN SOUND, ONTARIO
ESTABLISHED 1860

STEEL *for*
Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Nova Scotia Steel and Coal Co., Limited

Head Offices:
New Glasgow, N.S.

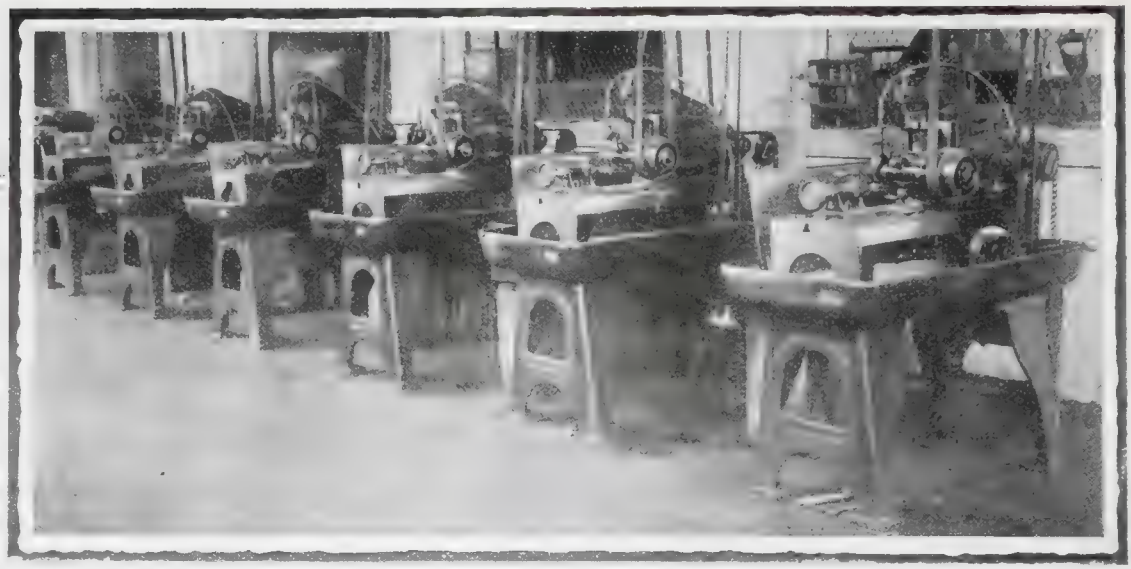
Sales Offices:
Western Room 14 Windsor Hotel
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process

If interested tear out this page and place with letters to be answered.

A Row of Time-Savers!

More pieces per machine is the result of Bilton Gear Miller practice. Their adaptability is almost unlimited on small work such as cutting spur, bevel mitre, angle gears, form cutting and many others.

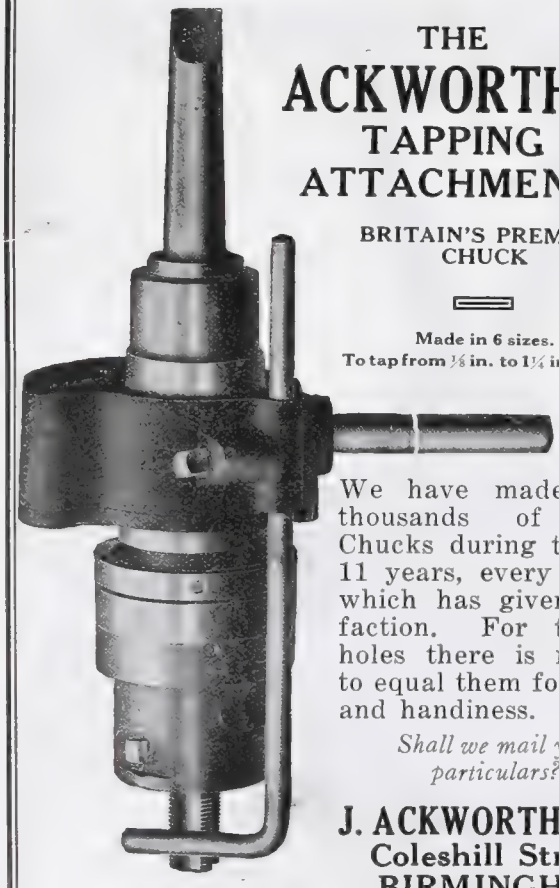


Bilton GEAR MILLERS

In Bilton Gear Millers the indexing takes place during the return stroke of the cutter. And the cutter is removing metal 90% of the time. This time-saving feature, coupled with extreme accuracy, has decided hundreds of leading manufacturers in favor of the Bilton for high production on accurate work.

Write for Catalog 30-6.

Bilton Machine Tool Co.
Bridgeport, Conn., U.S.A.
FOREIGN AGENTS:
Alfred Herbert Ltd.
Chas. Churchill & Co., Ltd.
M. Mett Engineering Co.



THE
ACKWORTHIE TAPPING ATTACHMENT.

BRITAIN'S PREMIER CHUCK

Made in 6 sizes.
To tap from ⅛ in. to 1¼ in. Whit.

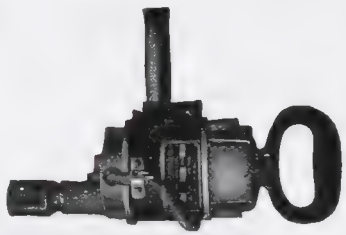
We have made some thousands of these Chucks during the last 11 years, every one of which has given satisfaction. For tapping holes there is nothing to equal them for speed and handiness.

Shall we mail you particulars?

J. ACKWORTHIE, Ltd.
Coleshill Street,
BIRMINGHAM

U. S. Electric Drills and Grinders

Save Time, Labor and Money



They can be attached to any lamp socket.

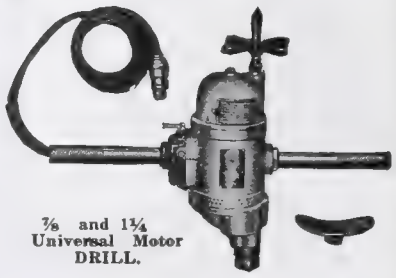
For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

3 SIZES
3-16 in., W.G.T., 6 lbs.
¼ in., W.G.T. 9 lbs.
⅝ in., W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

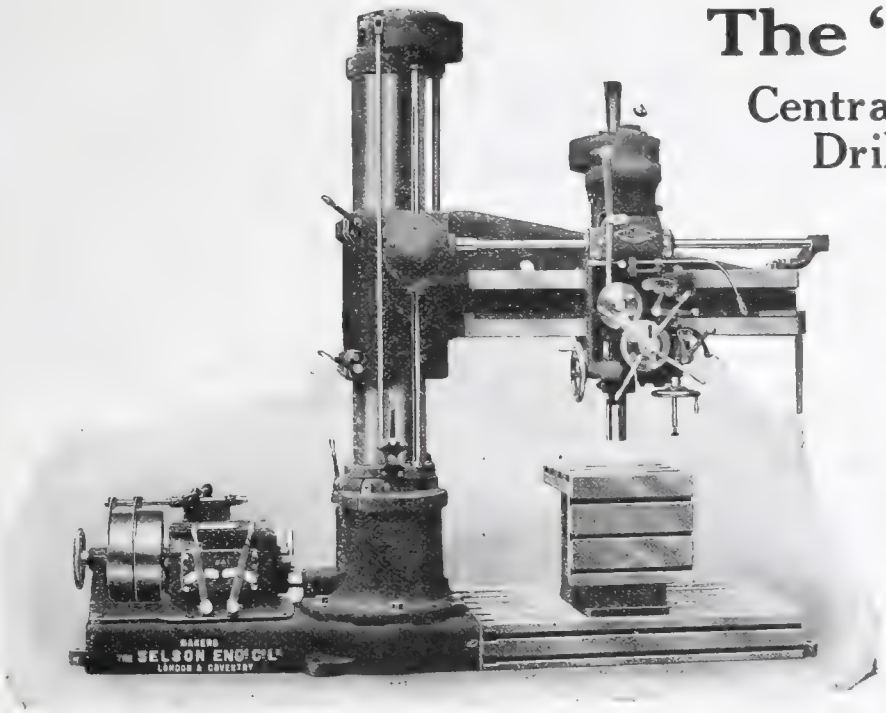
Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



⅜ and 1¼ Universal Motor DRILL.

For Sale By
The Canadian Fairbanks-Morse Co., Limited
Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO



The "Selson"

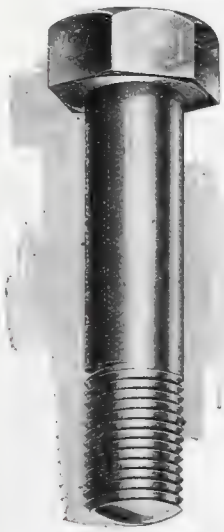
Central Thrust Radial Drilling Machine

The Selson form of Central Thrust is considered best for the arm of Radial Drilling Machines.

SELSON

Engineering Co., Ltd.

SELSON HOUSE, 83 and 85 QUEEN VICTORIA STREET
LONDON, E.C. 4, ENGLAND. WORKS: COVENTRY
Branches: Paris, Brussels, Turin, Milan, Melbourne, New York



ACCURACY

Just now all jobbers should have a complete stock of SAE Cap Screws, Plain and Castellated Nuts and Taper Pins to meet the automobile repair trade requirements.

Your rush orders filled promptly by

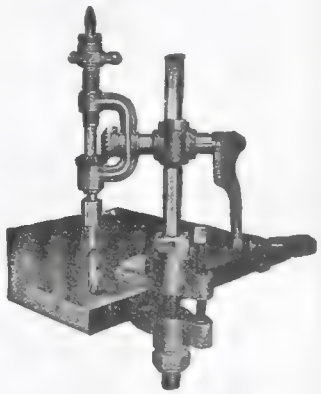
The Galt Machine Screw Co., Limited

GALT, ONTARIO

Eastern Representatives:
Messrs. F. BACON & COMPANY
131 St. Paul Street West, Montreal, Que.
Western Representative:
Mr. D. PHILIP
138 Portage Avenue, Winnipeg, Man.

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net.
Sold by all Machinery and Supply Houses.

A. B. JARDINE & CO., Limited

HESPELER, ONTARIO

If interested tear out this page and place with letters to be answered.

HINTS TO BUYERS

VICTORIA Special Machinery
DESIGNS PATTERNS
CASTINGS FORGINGS
Send for Catalogue
Victoria Foundry Co., Limited, Ottawa, Canada

DARLING BROTHERS, LIMITED
Engineers, Manufacturers and Founders
120 Prince Street, MONTREAL, P.Q.
Pumps for any Service—Steam Appliances—Freight Elevators—Webster Vacuum Heating System.

DIE-CASTINGS
ACCURACY—SERVICE
Fisher Motor Co., Ltd.
ORILLIA - ONTARIO

"Nichrome" Castings
"Made to Endure High Temperature"
CANADIAN DRIVER-HARRIS CO., Ltd.
WALKERVILLE, ONT. CANADA
WESTERN OFFICE AND DEPOT CHICAGO 28 SO. JEFFERSON ST
AMERICAN OFFICE AND WORKS HARRISON, N.J.
BRITISH WORKS MANCHESTER ENGLAND

The Hughes Owens Co. Ltd.
MONTREAL TORONTO OTTAWA WINNIPEG
Manufacturers
Blue and Black Print Papers
Drawing Office Supplies for Students, Architects and Engineers.

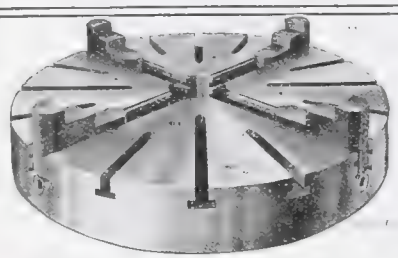
Mechanical Engineering Company
Limited
PRACTICAL AND CONSULTING ENGINEERS
Builders of "MECOL" Industrial Furnaces for use with oil, gas or coal fuel
Executive Offices
Room 408, 3 St. Nicholas St.
Montreal
General Offices and Works
Three Rivers, Que.

THE FELLOWS GEAR SHAPER
is used by the Largest Manufacturers in the Gear Industry.
Catalog and Engineering Literature sent to those interested.
Address:
THE FELLOWS GEAR SHAPER CO.
SPRINGFIELD, VERMONT, U.S.A.

CASTINGS
MALLEABLE AND GREY IRON
FITTINGS Limited, OSHAWA

ENGINEERS PLANNING POWER TRANSMISSIONS
Secure Data and Estimates of "MORSE" DRIVES
SAVE Construction, Space, Light, Fuel. Producing More with Less.
MORSE CHAIN CO., - ITHACA, N.Y.
Engineering Service, Assistance, Bulletins
Atlanta, Baltimore, Boston, Charlotte, N.C., Chicago, Cleveland, Detroit, Kansas City, Minneapolis, Montreal, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis

SHEPARD
ELECTRIC CRANES & HOISTS
FOR EVERY LIFTING SERVICE
SHEPARD ELECTRIC CRANE & HOIST CO., 426 Schuyler Ave., Montour Falls, N.Y.
Representative: Rudel-Belnap, Montreal
Agents in principal cities



***IRON BODY* INDEPENDENT CHUCKS**
They represent strength and economy with high-speed cutting tools. Accurate and dependable always.
Our **All-Steel** Independent Chucks have established records for accurate, long-wearing qualities. We also make Geared Scroll Chucks and the Geared Scroll Combination. Ask for particulars.
UNION MANUFACTURING COMPANY
New Britain, Conn. New York Office: 26 Cortlandt Street

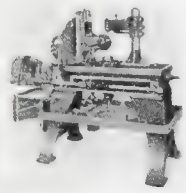
IMPORTERS OF
WHEEL TRUEING TOOL CO.
DETROIT
MANUFACTURERS OF

INDUSTRIAL DIAMONDS

Goods Submitted on Memorandum if Desired
JOHN W. GORDON, Manager
5 James Street, ST. CATHARINES, ONTARIO

DIAMOND POINTED TOOLS

All Mountings Fully Guaranteed
Office and Factory:
88 West Pitt Street, WINDSOR, ONTARIO



Gear Cutting Machines

Hand Feed
Semi-Automatic, Fully Automatic
Also Lathe Chucks and Centering Machines
THE D. E. WHITON MACHINE CO.
NEW LONDON, CONN., U. S. A.

PRESSES and SHEARS

Sheet Metal Working Machinery
THE D. H. STOLL CO., INC.
26 Lansing St., BUFFALO, N.Y.

WELDING AND CUTTING
DAVIS APPARATUS
DAVIS-BOURNONVILLE CO.
"MADE IN CANADA"
Oxy-Acetylene Process

DAVIS - BOURNONVILLE COMPANY
Welding and Cutting Apparatus
TORONTO, ONTARIO
Factory and Sales Offices: 32-34 Eastern Ave.
MONTREAL, QUEBEC
Sales Offices: Coristine Building.
UNITED STATES
Factories and General Offices: Jersey City, N.J., U.S.A
Branches in Principal Cities of the United States and in Foreign Countries.

Miller Bros. & Sons, Limited

Founders, Machinists, Millwrights and Engineers
120 Dalhousie St., Montreal

STEEL CASTINGS

ELECTRIC Steel Castings of all kinds from 5 pounds to 5,000 pounds.
PROMPT DELIVERY

Manitoba Steel Foundries, Ltd.
1204 McArthur Building
Winnipeg - - - Manitoba

FOR SERVICE ON
Jigs, Fixtures, Gauges
SPECIAL MACHINE TOOLS
SPECIAL MACHINERY
General Machine Work and Repairs
Write
The Crescent Machine Co.
LIMITED
20 Longueuil Lane Montreal, Que.

NORTON JACKS

FOR ALL KINDS OF HEAVY LIFTING
Send for complete catalogue showing 50 styles 10 to 100 tons capacity.
Made only by **A. O. NORTON, Limited**
Coaticook, Prov. Quebec, Canada

THE SKINNER CHUCK COMPANY
NEW BRITAIN, CONN U S A
SKINNER CHUCKS
LATHE - DRILL - PLANER - CHUCKS

SHEFFIELD ENGINEERING SUPPLIES LIMITED
"DORMER" BRAND
H. S. DRILLS REAMERS STEEL
MILLING-CUTTERS FILES HACK-SAW BLADES
"Safety" Plastic Metallic Packing
230 CRAIG ST. W. MONTREAL, CANADA

Monel Metal Castings

For Anti-Corrosive and Superheat Service
Made in Canada by
CANADIAN DRIVER-HARRIS CO.
WESTERN OFFICE AND DEPOT CHICAGO 28 So. JEFFERSON St.
WALKERVILLE, ONT. CANADA
AMERICAN OFFICE AND WORKS HARRISON, N J
BRITISH WORKS MANCHESTER ENGLAND

WE MANUFACTURE RIVETS of every description, 5/8 inch dia. and smaller

PARMENTER & BULLOCH CO., LTD.
GANANOQUE, ONT.

Canadian Steel Foundries Need Frost Improved Sand Mills

WINNING FEATURES

Heavy Mullers
Unloading Device
Motor or Belt Drive

The Frost Mfg. Co.
112 W. Adams St., Chicago

NORTHERN CRANES

"MADE IN CANADA"

Electric Travelling Cranes, Hand Cranes, Electric Hoists, Air Hoists, Foundry Equipment, Cupolas, Ladles, etc., etc.

"Type D" Electric Hoist

NORTHERN CRANE WORKS LIMITED
WALKERVILLE, ONTARIO

McFarlane's Belt Dressings

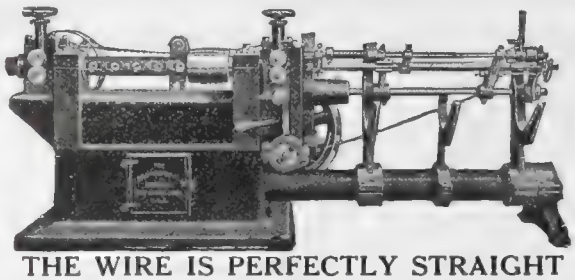
FOR ALL TYPES OF BELTS

Leather, Canvas, Balata, Cotton, etc.

Preserves the Belts, prevents slipping, jumping, stretching and fraying.

Ensures highest efficiency in transmission of power.

Burgess & Marchand
614 Drummond Bldg. - MONTREAL



THE WIRE IS PERFECTLY STRAIGHT

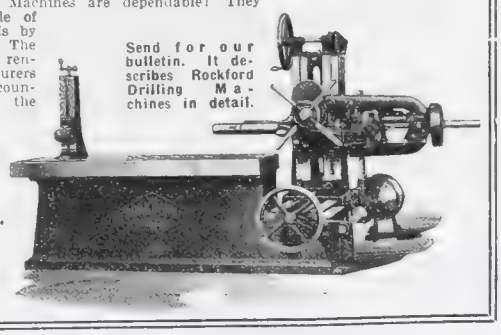
and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock. May we send you catalogue C?

The F. B. SHUSTER COMPANY, New Haven, Conn.
Formerly John Adt & Son. Established 1866.
Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

ROCKFORD DRILLING MACHINES

Note the lateral and vertical adjustment of this Rockford Drilling Machine It operates anywhere on a surface 18" high by 36" wide! Rockford Drilling Machines are dependable! They are carefully made of the finest materials by skilled workmen. The service they are rendering manufacturers throughout the country proves that the design is right.

Send for our bulletin. It describes Rockford Drilling Machines in detail.



The Rockford Drilling Machine Company
Rockford, Ill., U.S.A.

Canadian Agents: Rudel-Belnap Machinery Co., Toronto and Montreal.

Hand Oil Pumps

which obviate drips and oil-soaked floors, thus minimizing fire hazard, and providing economical means of handling.

Air Compressors, Gear Cutting.

Hamilton Motor Works
LIMITED
Hamilton, Canada

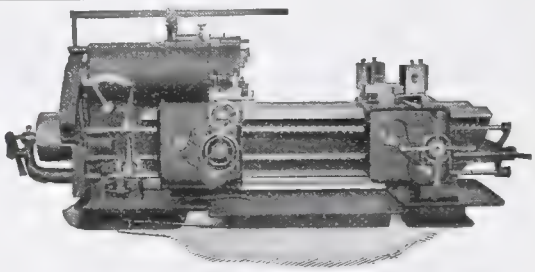
Put Economy Into Your Drilling

AURORA Drilling Machines

Aside from the Accurate, Convenient and Quick-Operating features of Aurora Drills, there's **Economy** to consider. Aurora Drills conserve both power and labor.

Built in Stationary and Sliding Head sizes.

The
Aurora Tool Works
Aurora, Ind.



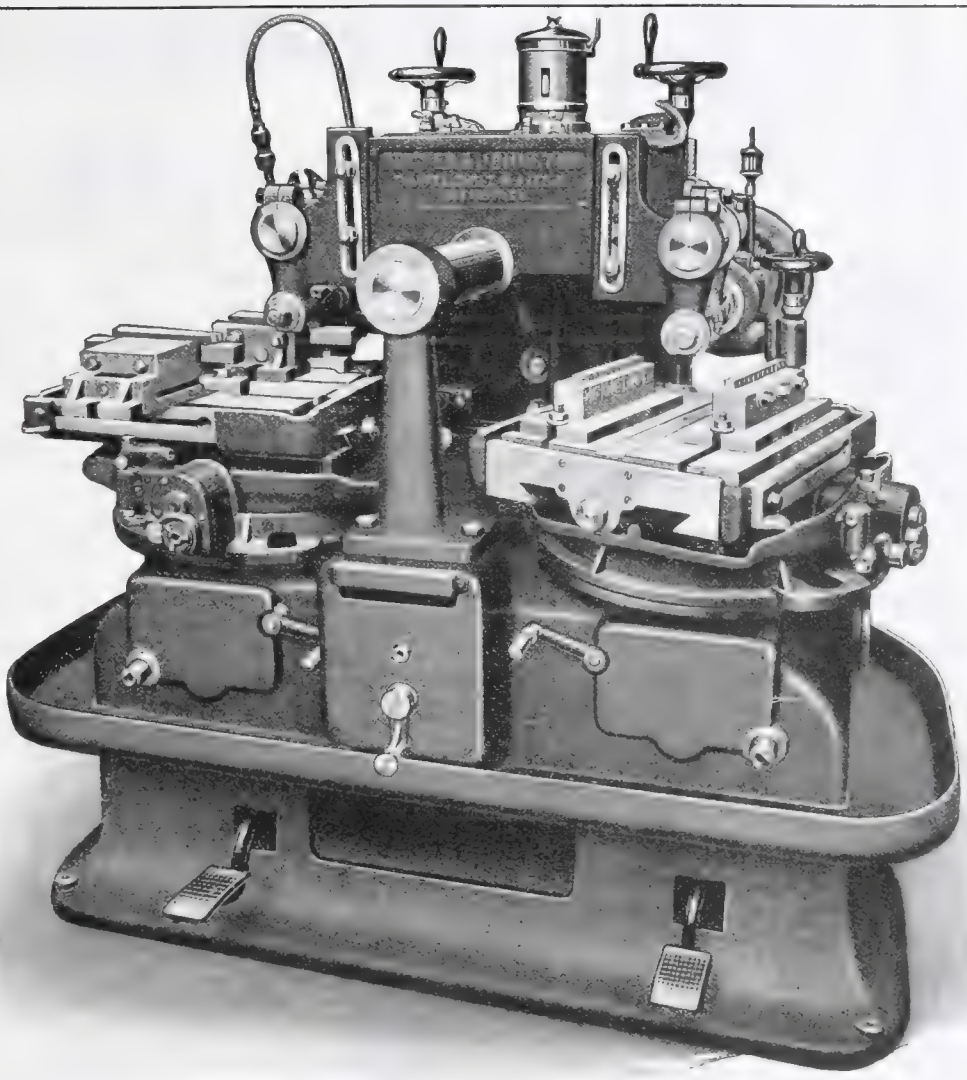
LET US TELL YOU ABOUT THIS MACHINE

Send Us Prints of Your Work

STEINLE TURRET MACHINE CO.
MADISON, WIS., U.S.A.

TRY THE STEINLE

PRODUCTION MILLING



The Potter & Johnston 1-M-Milling Machine has been designed to allow two distinct classes of work to be produced at the same time without the operator moving away from the operating position.

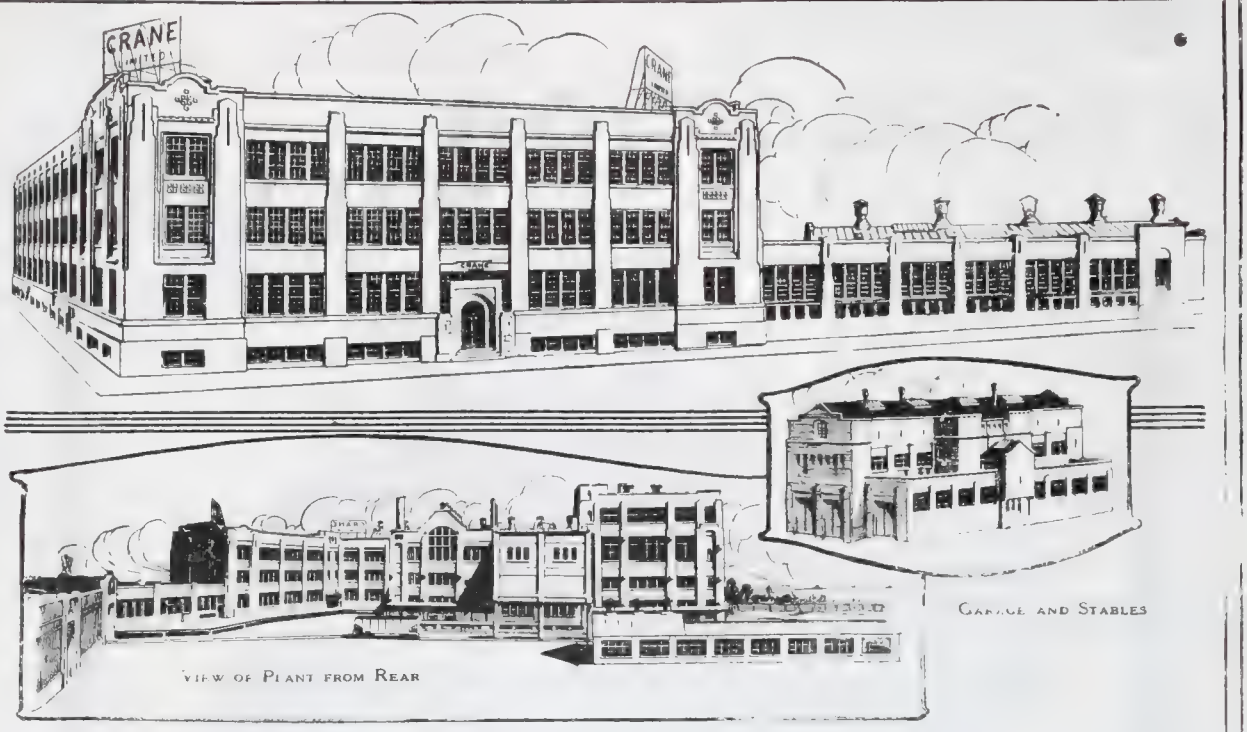
Write for Bulletin No. 53.

Canadian Offices: POTTER & JOHNSTON MACHINE CO.

ROELOFSON MACHINE & TOOL CO., LIMITED

Head Office and Show Rooms:
11 Wellington Street East—TORONTO, CANADA

If interested tear out this page and place with letters to be answered.



View of Plant from Rear

Garage and Stables

CRANE
LIMITED

Manufacturers of Valves, Fittings and Piping Equipment and Distributors of Pipe, Plumbing and Heating Supplies.

The establishment of Works at Montreal and Branches (carrying complete stocks) in other principal Cities of Canada enables us to give "CRANE" service and quality throughout the Dominion.

CRANE Quality — Any Purpose or Pressure

Cast Iron Fittings, Screwed and Flanged.
Malleable Iron Fittings.
Cast Steel Flanged Fittings.
Forged Steel Screwed Fittings and Flanges.
Unions and Flange Unions. All iron, all brass, brass to iron.
Brass Fittings, Screwed and Flanged.
Drainage Fittings.
Valves (brass, iron and steel.)
Power Plant Equipment : Pipe Bends, Flanged and Screwed Pipe.
Steam Specialties.

CRANE Quality

Plumbing and Heating Materials. The last word in equipment for the Home, Factory, Office, or any other type of building.

Branches and Warehouses
Halifax, Ottawa, Toronto, Winnipeg, Regina, Calgary, Vancouver.

Sales Offices:
Quebec, Sherbrooke, Hamilton, Victoria.

CRANE LIMITED
HEAD OFFICE & WORKS
1280 ST PATRICK STREET
MONTREAL

CRANE BENNETT Limited
Head Office and Warehouse:
London, England.

Sales Offices:
Manchester, Birmingham

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

NAMCO

U.S. STANDARD CAP AND SET SCREWS

STANDARD

V. & U. S. S. Semi-finished Nuts
V., U.S.S. & S.A.E. Cap Screws
V. & U.S.S. Set Screws
S. A. E. Plain & Castellated Nuts

SPECIAL

Screw machine product up to 2¼" diam.—to specifications. Hardened and ground screw product—to specifications.

THE NATIONAL ACME COMPANY

MONTREAL, P. Q.

De Courcelles G. T. R. R.

If interested tear out this page and place with letters to be answered.

Speed PLUS Precision

In the design of Starrett Tools, *convenience* as well as accuracy is kept well in mind.

Mechanics who use fine tools prefer Starrett Tools not only because of their accuracy, but because of their durability and convenience.

This combination of qualities—characteristic of Starrett Tools—adds *speed* to precision in making the fine measurements of modern shop practice.

Catalog No 22 "3" sent free on request

THE L. S. STARRETT CO.

The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled

Athol, Mass.

Starrett Bench Micrometer Caliper:
For measurement by thousandths or ten-thousandths up to one inch. Made with heavy base; very rigid and accurate.

Starrett Tools

STARRETT TOOLS

STARRETT HACK SAWS CUT QUICKER LAST LONGER

42-104

Weatherproof Roofs—Old and New

Now is the time to fix roofs. Scores of buildings need roofing. Scores of roofs need repairing. If done now they will be all ready for the spring rains.

HEXAGON SLAB SHINGLE

Hexagon Slab Shingle is durable; it will give years of consistent roof service without repair costs. It is fire-resisting, too.

The hexagonal figures present a distinctive and attractive surface. The patented design produces a beautiful shadowed effect that adds to the pleasing appearance of the roof.

ASBESTOS FIBRE (Liquid) CEMENT

a rubberlike adhesive and tough preparation made from finest asbestos fibre, creosote and durable oils. Makes any roof, no matter in what condition, absolutely proof against climatic conditions. Easily applied over any kind of roof: metal, gravel, paper or composition.

JEWEL ROOFING

Comes in 1, 2 and 3-ply, guaranteed respectively for 3, 5 and 8 years. We think it is the best value on the market for this quality of roofing.

EXCELLO ROOFING

—a better grade roofing with a longer guarantee. Comes in 1, 2 and 3-ply, guaranteed for 5, 10 and 15 years respectively. Place your orders early.

ASBESTOS SHEATHING

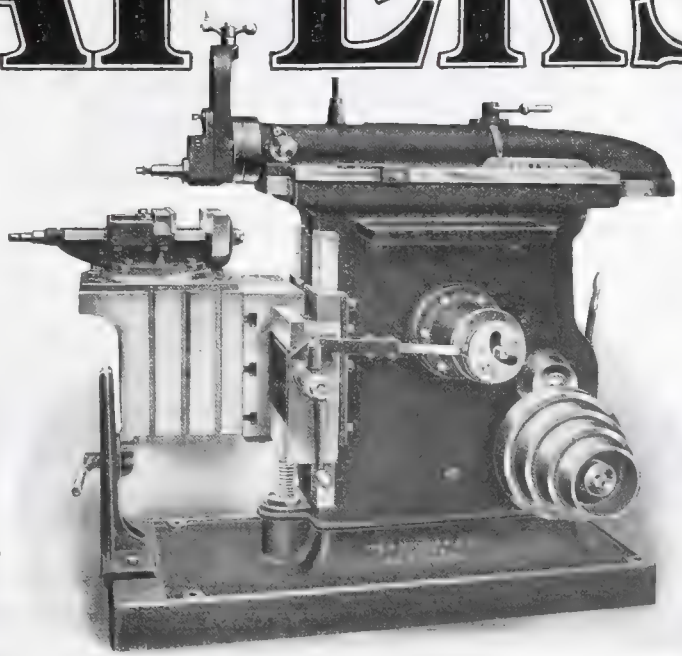
There is a constantly growing tendency to consider fireproof buildings as a necessity. Asbestos Sheathing is a recognized fire-prevention material.

We also carry a full stock of regular lines of plain and tarred felt in 10, 12 and 16-oz. weights.

WRITE FOR PRICES

Rice Lewis and Son, Limited, Toronto

McDOUGALL SHAPERS



Modern machines characterized by simple, clean-cut design and inflexible rigidity combine the best features of machines hitherto on the market, but with all unnecessary complications excluded.

We shall be glad to send you complete specifications and descriptions.

The R. McDougall Co., Ltd.
GALT, ONTARIO
THE CANADIAN FAIRBANKS-MORSE CO., LIMITED
Sole Agents

If interested tear out this page and place with letters to be answered.

Brown & Sharpe Tools are an Incentive In Obtaining the Best Workmanship

NOT only the kits of your mechanics but your tool crib should be equipped with the tools that, for three generations, have been the choice of skilled mechanics the world over.

The careful design of these tools is such that they are readily adapted to the work intended—the use of the best material assures their durability—and the expert workmanship that enters their manufacture, together with rigid inspections, are your assurance of accuracy. These are a few of the important features that determine Brown & Sharpe Tools as an incentive for the best workmanship.

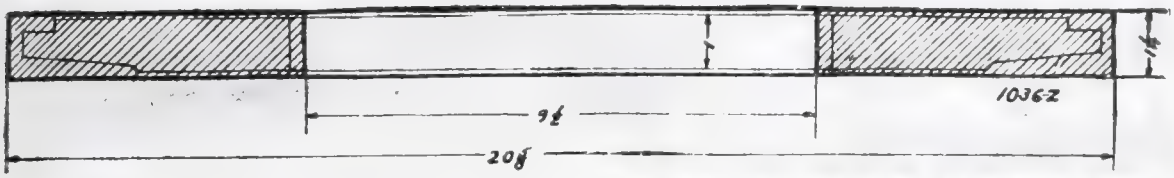
Send for a No. 28 Small Tool Catalogue.
It should be in your kit or on your desk.

BROWN & SHARPE MFG. CO.

PROVIDENCE, R.I., U.S.A.

If interested tear out this page and place with letters to be answered.

GISHOLT



40 Minutes Typical Boring Mill Production

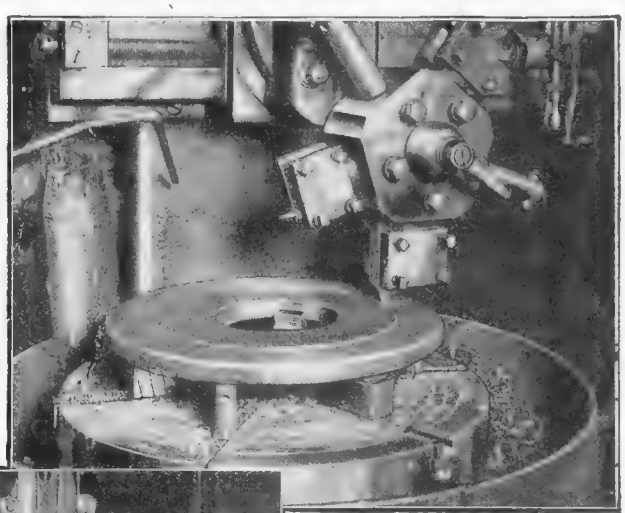
The workman shown at the right is interested in the job.

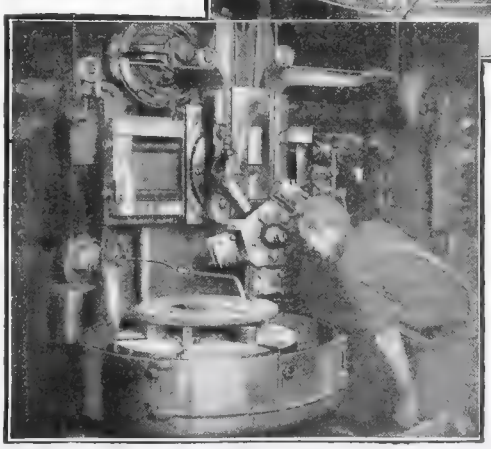
You are interested in the time it takes to do it.

The workman appreciates the ease with which the job is handled and the confidence he has in the machine.

You appreciate what these qualities mean to the cost of handling this, and similar work.

The part shown is a Scroll Plate for Chuck. Material, steel forging. Finished all over in two operations on the Gisholt Vertical Boring Mill.





Why not let a Gisholt Salesman study your Boring Mill operations? Our men are trained to render you valuable service along this line.

GISHOLT MACHINE CO. 1207 East Washington Ave. MADISON, WIS., U. S. A.

Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery, etc.

Eastern Sales Office: 30 Church St., New York. *Works:* Madison, Wis.; Warren, Pa.

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria

If the platform system fits your business

—you cannot afford to be without it

Jacklift Trucks have perfected the platform system, because they operate in less space, with fewer delays, with less man power, and they stand the roughest usage. Jacklift Trucks save floor space because they lift with the handle at the side, so that no more room is required to lift the load than is required to move the load about. Remember this when buying elevating trucks. The less aisle room you use, the more space you have for production and storage. The aisles need not be wider than the space necessary to pull out the loaded platform into the aisle—usually this is about 15 inches more than the length of the wood platform.

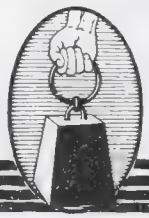
The platform system of moving materials is saving time for leading concerns in the handling of different commodities.

If it isn't here —write us

Two and Four-Wheel Trucks
Yale Industrial Electric Trucks
Industrial Track Electric Cranes
Jib Cranes
Trolley Conveyors
Yale Hoists
Lowden System Belt Conveyors
Elevators
Crane Suspension Scales
Trolley Scales
Track Scales
Dial Scales
Portable Scales

Ask our nearest Branch House for any information you require

Fairbanks-Morse



Canada's Departmental House for Mechanical Goods

Halifax, St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, St. Catharines, Windsor, Fort William, Winnipeg, Regina, Saskatoon, Calgary, Edmonton, Vancouver, Victoria

CANADIAN MACHINERY
AND
MANUFACTURING NEWS

VOL. XXV. No. 15. April 14, 1921

Producing 900 Float Valve Seats Every Hour

Automatic Procedure in the Making of Spark Plug Shells, Carburetor Float Valve Seats, Piston Wrist Pins, Transmission Bolts, Sewing Machine Screws, Cylinder Priming Bodies and Nuts in Quantity

By J. H. MOORE

PRODUCTION met in with a real companion when automatic machinery came into being. True, the term automatic machines covers a very wide field, but what we are particularly interested in is automatics as used in the machine tool industry, that is, for production purposes.

There is a story told of an old-time machinist who could not see why these new-fangled machines should be catered to. "The old lathe is good enough for me" was his favorite expression, until one day the boss asked him, merely for a joke, to make 5,000 screws, all of the same size and length. That finished him, and from that day on he saw the force of the argument for production, also the need of some kind of production tool. It's a case of getting out the work as speedily as possible, and in the material to follow we shall illustrate how one concern is helping manufacturers solve their production problems. It is not our intention to compare or comment upon this method but rather to present the data on these jobs to our readers, leaving them to study the same at their leisure. There will doubtless be points brought up that will help solve some other problems, and if so we will be well repaid for our efforts in preparing this data.

Automatic Screw Machine

First of all, the purpose of this type of machine is too well-known to require detailed comment, and yet there are a few still existent who believe that such a machine is for the making of screws only. Of course, this is an erroneous impression, for briefly such a machine is designed to produce that large class of work which can be made from bar stock, the parts being drilled, formed, threaded, etc., on the bar, and then cut off.

There are various types of these machines but to treat them in detail would take a volume in itself, so for the purpose of this article we have confined our data to one type of machine, that made by the New Britain Machine Co., New Britain, Conn., and to this firm we owe thanks for the data afforded us.

Fig. 1 shows the general appearance of one of these machines, and, briefly, here is a description of its principal parts. As will be noted it consists of six spindles, these being contained in suitable bearings. There is also a spindle cylinder, this being contained in a cylinder housing. An end working tool slide forms part of the machine, its function being self-apparent. Generally speaking, the operations which the machine is adapted to perform in the several positions are as follows:

First position—feeding to a stop, centering and drilling. Second position—box tooling, drilling and rough forming. Third position—box tooling, drilling and finish forming. Fourth position—box tooling, drilling, counterboring, reaming, undercutting, or any end operation. Fifth position—threading, or any other end operation. Sixth position—cutting off.

In the fifth, or threading position,

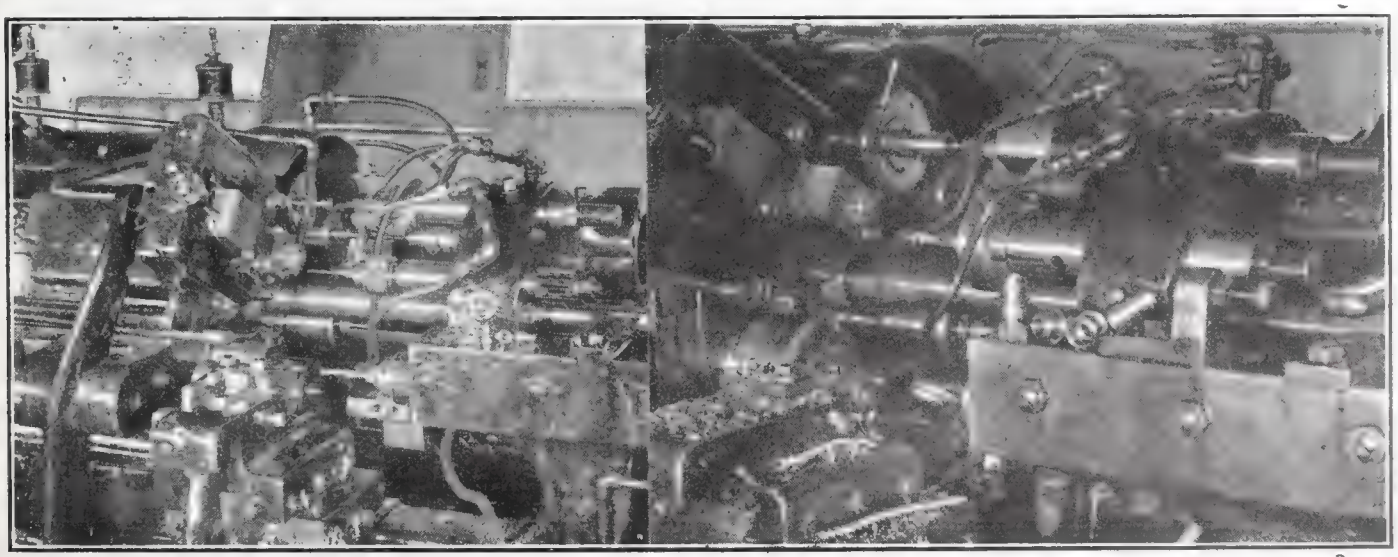


FIG. 2 MACHINING CARBURETOR FLOAT VALVE SEAT.

FIG. 1 PRODUCING A SPARK PLUG SHELL.

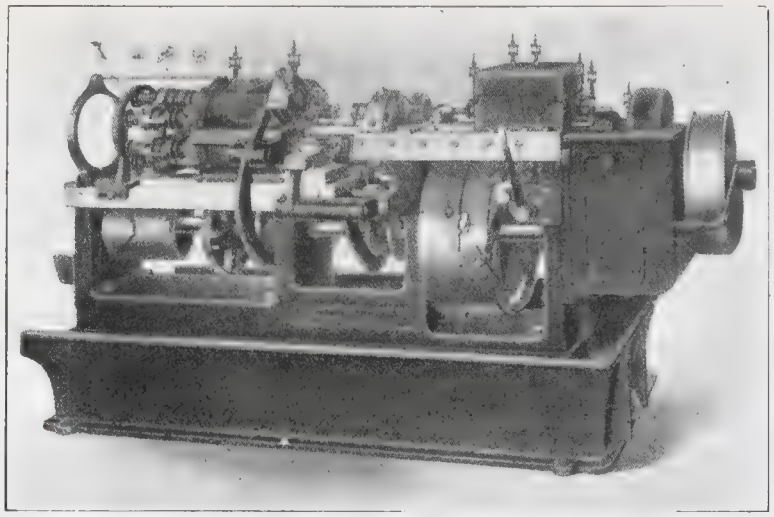


FIG. 1—FRONT VIEW OF A SIX-SPINDLE AUTOMATIC.

there is an extra large tool shank hole which is bushed to the standard size and fitted with a bearing cap. The removal of this cap and bushing makes it possible to take out any spindle, by indexing it into that position, without disturbing the cylinder or tool slide.

The tool slide is operated by a feed cam and drum, these being capable of adjustment for the entire range of tool slide travel. Should an operator wish to stop his power feed, convenient hand levers control these feeds, and they can be stopped instantly.

Two forming slides, in addition to a cut off slide, form a part of the machine, and by the addition of an elevating block to the cut off slide forming can also be done in the fifth position. These slides are independent of each other, the lower one, for rough forming, being mounted on the frame, while the other slide, used for finish forming, is attached to the spindle cylinder housing, and is so placed that its plane is at right angle with the spindle axis.

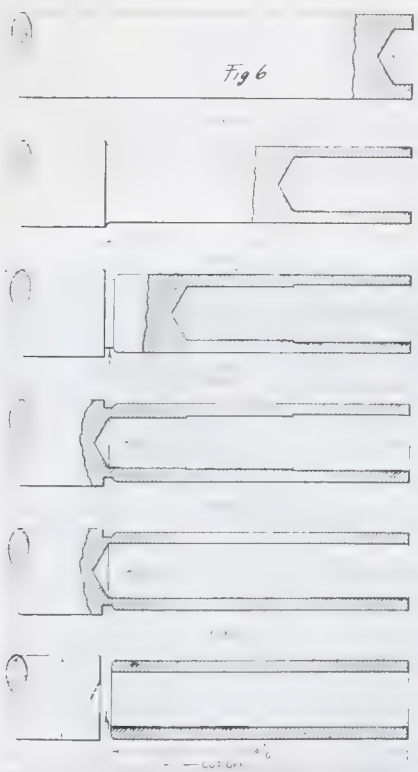


FIG. 6 STEPS IN THE MAKING OF A PISTON WRIST PIN.

Tools and Attachments

We shall not go further into the design of the machine itself, but will dwell for a moment on the style of tools and attachments used in conjunction with the machine. Six end-working tools are accommodated by the tool slide. The direction of spindle rotation permits of the employment of standard right hand drills, reamers, counterbores, etc., and, of course, this feature means that the majority of tools used are regular stock cutting tools.

Generally speaking, a standard equipped machine consists of two universal adjustable box tools, three adjustable tool holders for tool slide and two forming tool holders. As already stated, forming can be accomplished in the fifth position by using a forming slide extension.

Revolving drilling spindles can be applied in the third and fourth positions to speed up small drills, these being gripped in chucks and running against the direction of work rotation. On short work special drill speeders can be used to run in second, third, fourth or fifth positions. Of course, where necessary, the use of such speeders accelerates production, reduces drill breakage and insures concentricity of hole with outside.

A multiple turning attachment can be fitted to the lower forming slide of such machines, this being designed for work on gas engine wrist pins, or pieces of similar form where the length to be turned is considerable, but the amount of stock removed comparatively small. Four or more cutters are fed in the required depth, after which the tool slide moves parallel with the work approximately one inch. This, of course, reduces turning time, as the work can be finished in one-fourth of the time ordinarily required.

In some cases an accelerating reamer attachment is used for work on which the drilling is done in steps, the arrangement being such that the feed and travel of reamer are from two to four times that of the drills.

The threading mechanism is designed to cut right and left hand threads, and without going into the details of construction, enough to say it has a tripping arrangement that permits threading practically up to a shoulder. The only changes necessary for cutting left hand threads are the reversing of a pawl in the die holder, and the interchanging of two dogs on the cam drum.

It will be noted that we have given no detailed description of these cam drums, but this has been done intentionally, as what we are after particularly is examples of work performed,

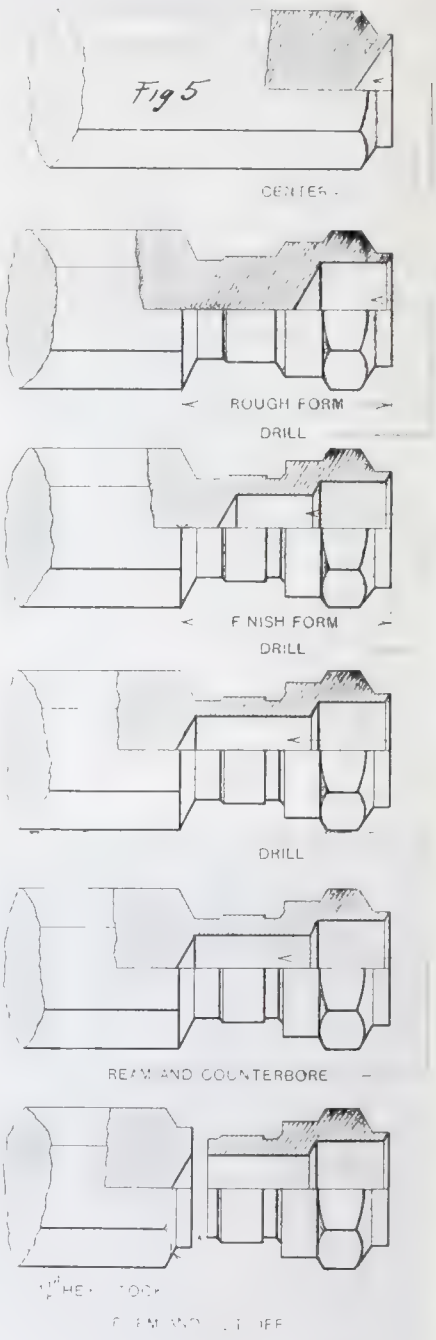


FIG. 5—MAKING A SPARK PLUG SHELL.

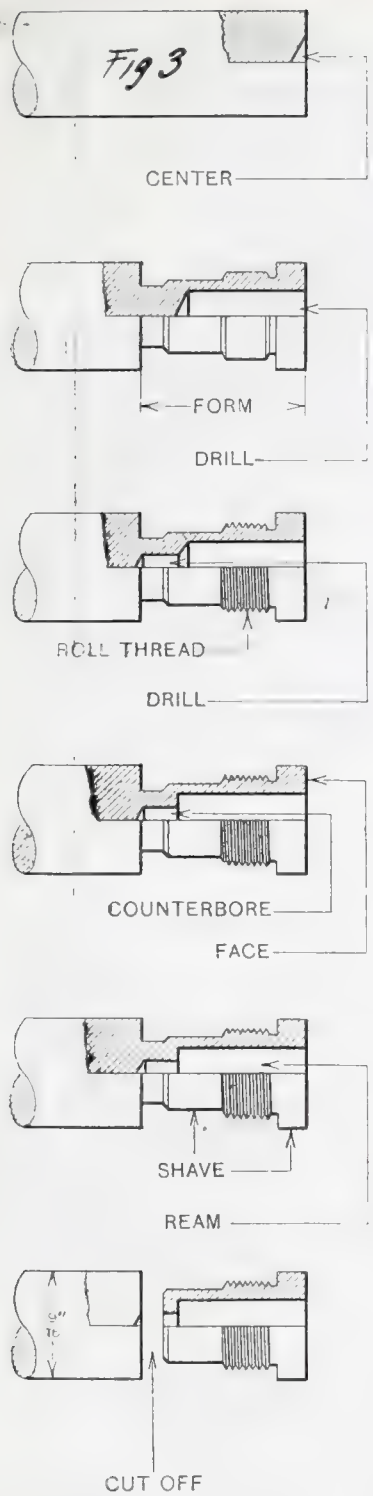


FIG. 3 MACHINING A CARBURETOR FLOAT VALVE SEAT.

not so much the design of the machine, In fact the preceding description is longer than we first of all intended, but the main points could not be told in less space.

Examples of Work

The first example, Fig. 2, depicts the machining of a carburetor float valve seat, this piece being made of brass. At Fig. 3 is shown the step by step procedure in the making of the part. First the work is centered, then drilled and formed as shown. The thread is next rolled, and at the same position the smaller hole is drilled.

The fourth step is counterboring and facing, while at the fifth position the outside unthreaded portions are shaved to size, and the large hole reamed as shown. The last position is, of course, devoted to cutting off. Nine hundred pieces per hour are produced with this arrangement of tooling.

Fig. 4 depicts the machine set up for producing a spark plug shell, this piece being made from regular screw stock. Again let us follow the different steps at Fig. 5. First comes the centering, then next the drilling and rough forming. At the third position the piece is finish formed, and drilled further in, but to a smaller size. The fourth step is simply a case of drilling still deeper, while the holes are reamed and counterbored at the fifth position. The sixth and last position is devoted to cutting off, and it will be noted from this view that the stock which these pieces are made from is 1⅛-inch hexagon. The production with this arrangement of tooling is 256 pieces per hour.

A good example of deep drilling is shown at Fig. 6. It is interesting to note the steps taken in the completion of this piece, which is a piston wrist pin made of chrome nickel steel. The first step is, of course, centering. The second position is that of drilling for a certain distance in, at the same time turning the outside diameter.

The third step is that of drilling still further with a drill of slightly smaller diameter, at the same time forming the portion shown in sketch. At position four the drilling is continued still further, and at position five this series of holes are reamed. The last step is that of cutting off. The production by this method is 38 pieces per hour.

Fig. 7 shows a transmission bolt in process of manufacture. The material in this case is screw stock, and the first step is that of feeding to a suitable stop. The next position is devoted to forming and turning a certain portion of the bolt, while the third step is that of turning the portion shown in sketch, also the forming of bolt head. Next another portion of bolt is turned, and at the same time the point is chamfered.

The fifth position is taken up with threading, while the last step is that of cutting off. It will be noted that the bolt is made from 9/16-inch stock, and is 3 1/16 inches long when finished. This example demonstrates clearly the advantage of studying the work.

Fig. 8 illustrates some clever tooling on a sewing machine screw. As can be noticed, the first step is that of centering. Drilling and forming are accomplished at position two, while drilling is continued at position three, the knurling of the screw head being done at the same time. Next comes the reaming at position four, while at position five threading is performed. The last step as usual is that of cutting off. This screw is made of regular screw stock, and 180 are produced per hour.

Some Further Examples

In many cases pieces are of such simple form that they do not require six spindles for their completion. In such instances the tooling can be so arranged to make possible the production of more

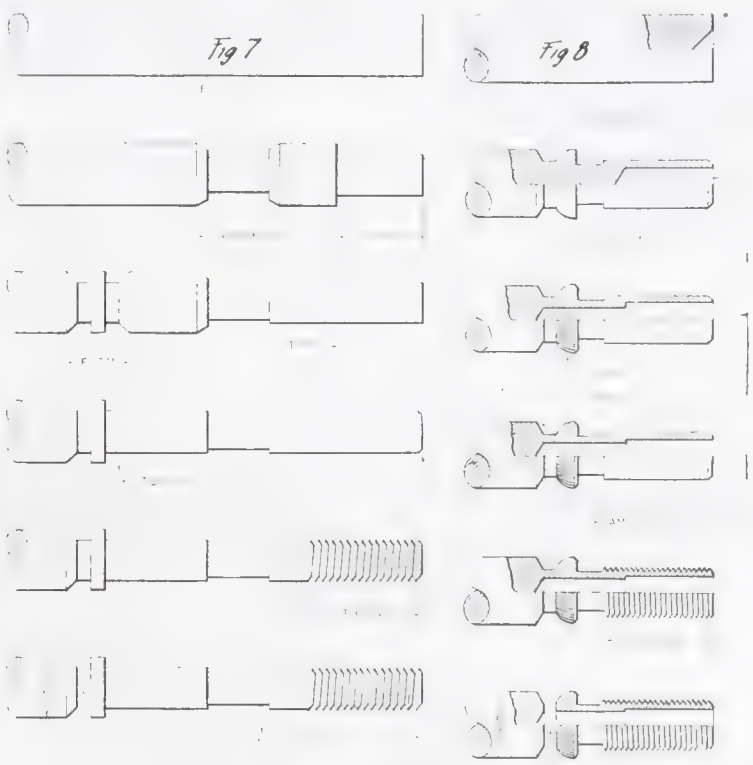


FIG. 7—PRODUCING A TRANSMISSION BOLT.
FIG. 8—MACHINING WORK ON A SEWING MACHINE SCREW.

than one piece at each indexing, cutting off at other positions, usually the third and sixth. Carrying the idea still further, the machines can be arranged to cut off in the second, fourth and sixth positions, thus permitting the handling of work commonly accomplished on single spindle machines—but with trebled production. This is largely a matter of experience, and as one gets more familiar with such machines, improvements on tooling can be made. In fact, when in doubt, it is a good plan to consult the maker of the machine, putting your problem direct. In practically every case they are only too pleased to give the benefit of their experience.

To illustrate the idea of producing more than one piece at each indexing, let us refer to Fig. 9. In this case the piece to be produced is a nut, and note carefully the steps taken. First comes centering. Next, the drilling part way and the forming of three nut blanks. At the third position the first nut is cut off, while the hole is drilled completely through the three blanks at position four. Positions five and six are devoted to cutting off, the second and third nut being cut respectively. It will be noted that the stock is 1⅝-inch hexagon, so that it can be plainly seen, with a little careful planning, production can be increased by efficient method of tooling.

We could go on indefinitely showing examples of work performed, but for the purpose of the article we will show only one more, that being the cylinder primer body shown at Fig. 10. The first step is drilling to the form shown, while rough forming is completed at position two. At step three a smaller size of finish form tool gets in its work. Step four is the drilling of a still smaller hole, while at position five the medium sized hole is tapped. At position six the part is cut off, but before this happens the counterbore is finished as shown. The material from which this piece is made is screw stock and 150 pieces are produced per hour.

These examples will in some measure help readers to size up the method of laying out tooling steps on automatics, and in a later issue we shall describe another type of machine, together with the work performed on the same.

LEADING ARTICLES IN THIS ISSUE

Producing 900 Float Valve Seats Every Hour 25

Making Spark Plug Shells—Float Valve Seats—Piston Wrist Pins—Transmission Bolts—Sewing Machine Screws, and Cylinder Priming Bodies.

Standard Practice for Small Jobbing Shop 29

This System Applies to Shops Employing One Hundred Men or Less, and Includes Quite a Number of Different Departments.

Importance of Inter-Shop Transportation .. 31

A Talk on Handling Problems Showing Advisability of Studying Your Handling Costs—Examples of Money Saved Are Given.

Tool Steel for Making Miscellaneous Tools 34

Using High Carbon Open Hearth Steel for Various Kinds of Tools—Composition of Such Steels, and How to Obtain the Best Results.

Creosoted Wood Block Factory Floors 36

Material Used—Problems Encountered—Conditions Met With in a Successful Installation—And How to Lay Floors Subjected to Considerable Moisture.

Canadian Machinery Weekly Contest 37

If You Haven't Tried This Contest So Far, Do So Now—Apart From the Prize, It's a Very Helpful Task, as It Familiarizes You With the Different Lines of Machine Tools.

An Interesting Eye-bending Fixture 38

A Fixture That Forms a Double Eye on Hinges—A Discussion of Forced and Shrink Fits is Also Included in This Section.

SCOOP-BODY INDUSTRIAL CAR.

An industrial car of the scoop body type, which can be used singly or as a trailer, has been placed on the market by the Easton Car and Construction Company of New York. A turn-table device, located below the body of the car, permits of revolving the body to any position and dumping from any of the four sides. The truck is provided with wide rim wheels equipped with roller bearings; the front axle is of the swivel type, with a machined cast-iron ball-bearing in the centre. It is adaptable to the handling of castings, machine cuttings, coal, sand, etc., and when used singly can be operated easily by one man.

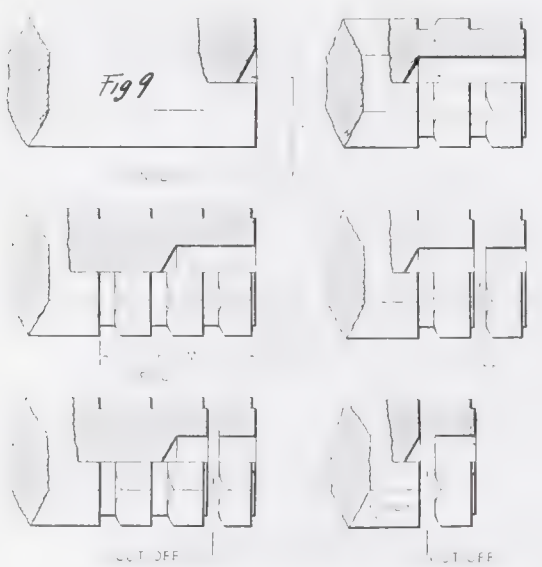


FIG. 9- PRODUCING NUTS IN QUANTITY.

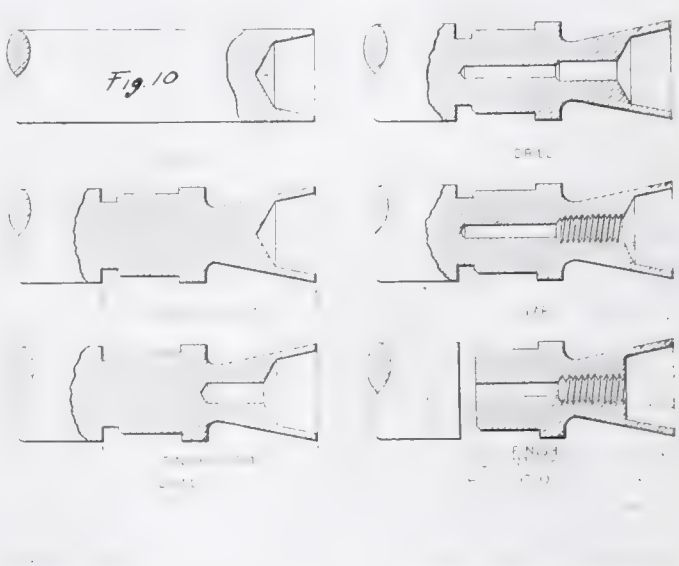


FIG. 10—MACHINING A CYLINDER PRIMING BODY.

Standard Practice for the Small Jobbing Shop

Practice Suitable for Shop Employing One Hundred Men or Less, the Business Consisting of General Jobbing Work and a Small Amount of Manufacturing—Departments Included: Pattern, Foundry, Machine, Plate and Electrical.

By M. B. SAUNDERS

THE small jobbing shop is neglected by writers on the subject of works management, they usually taking as illustrations the system or method as used by a concern employing a large number of men and it is not always very clear how it can be adapted to a small shop of, say, 100 men, especially if their principal work is of a jobbing nature.

Yet, for every large shop, there are a number of small ones, the managers of which have at some time or another struggled with this difficulty of getting enough system to obtain satisfactory results, without making it too unwieldy and expensive to operate.

The following is a description of a standard practice installed in a shop employing about 100 men, the business consisting of general jobbing work and a small amount of manufacturing. The works consisted of pattern shop, foundry, machine shop, plate shop and electrician shop.

When an order is received, here is the procedure: It is first O.K.'d for credit by the accountant and provided with its shop order number. It is next sent to engineering department, who see that all details are clear; they make out bill of material, arrange for necessary drawings or sketches, all manufacturing data and make out shop order on regular order blanks. They now check and return customer's original order, acknowledgement (green) and office copy (yellow) to general office. They pass on works copies, bill of material and all necessary data to production department.

The production department enters the order in production register, estimates its value, arranges delivery dates, and keep in touch during the progress through the works.

Sales and Quotations

On receipt of an inquiry, the sales department arranges specifications and prices. The engineering department supplies any data, drawings and sketches that may be required, but delivery dates are not made without first consulting the production department.

Engineering Department

This department passes on all shop orders, prepares necessary bill of material and supplies all necessary manufacturing data before they are passed on to production department. They also take charge of drawings, blue prints and all data. They prepare all drawings and sketches that may be necessary and also prepare preliminary estimates for special jobs and assist sales department when required. They obtain from accounting department each month all cost sheets, so that data may be compiled on all products to facilitate estimating. They also see that all drawings, blue prints, etc., are returned when order is completed.

Production Department

The production department has general supervision of orders and production. They keep progress register up to date, see that there are no delays, either between departments or waiting for material or instructions. They arrange delivery dates, and inspect all workmanship and material, also reporting to the main office each day all delivery dates that have been exceeded, stating reasons.

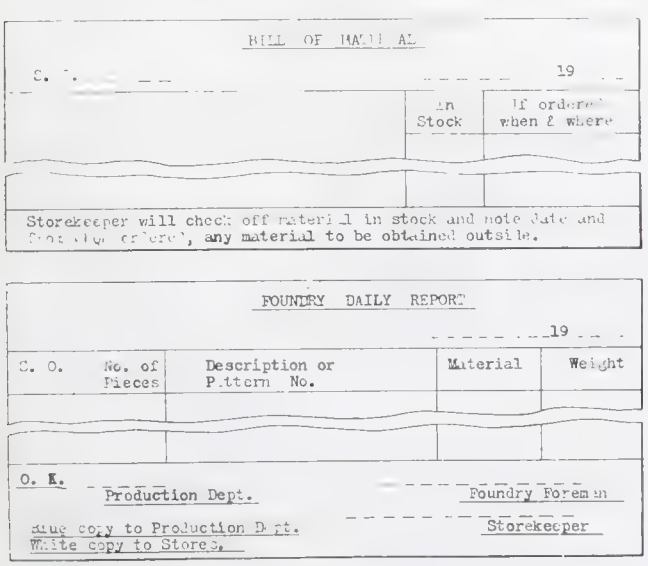
Foremen Generally

The foremen have control of, and are responsible for their own department. Each one will not accept verbal orders and all orders must come through the recognized channels as shown on management and operation charts. All interdepartment instructions and requests must be in writing and be O.K.'d by production department.

Each foreman is held responsible for the work in his department, and he must personally inspect all his work. The fact of a job passing inspection does not relieve him of responsibility in case of error. Each foreman operates his own department to its best advantage, but he must remember that one department cannot be run at the expense of another and that the works must be operated to the best advantage as a whole.

Pattern Shop Foreman

The foreman patternmaker has charge of patternmakers and carpenters, pattern store, and he is responsible for its condition and contents. When a pattern is ready for the foundry, after being carefully checked, a foundry ticket is made out in duplicate, showing exactly how many castings are required, the


BILL OF MATERIAL

C. O. _____ 19 _____

	In Stock	If ordered when & where

Storekeeper will check off material in stock and note date and [illegible] ordered, any material to be obtained outside.

FOUNDRY DAILY REPORT

_____ 19 _____

C. O.	No. of Pieces	Description or Pattern No.	Material	Weight

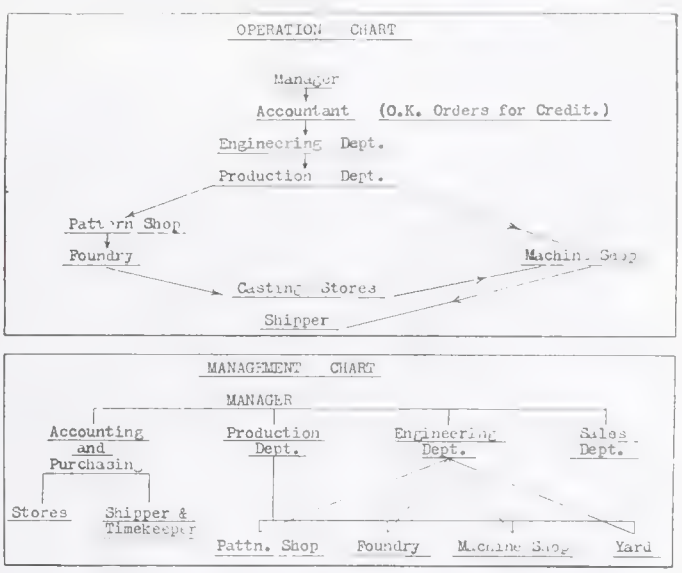
O. K. _____ Production Dept.

Blue copy to Production Dept.
White copy to Stores.

_____ Foundry Foreman

_____ Storekeeper

TYPE OF FORMS USED FOR MATERIAL LIST AND FOUNDRY.



SHOWING BOTH THE OPERATION AND MANAGEMENT CHART.

SHIPPER'S DAILY REPORT

_____ 19_

S. O.	Name	Address	Description	Order Complete or Part Only?	Weight of Castings	Shipp'g Weight	Freight or Express

Blue copy to Production Dept. White Copy to Main Office.

PRODUCTION DEPT. REGISTER

S.O.	Name	Description	Approx. Value	Eng. Data	Patterns	Fdy.	Mach. Shop	Delivery Date	Date Shipped

THE SHIPPER'S REPORT, ALSO PRODUCTION DEPARTMENT REGISTER.

date, S.O. number, customer's name and description. Both these tickets are handed to the foundry foreman. Patterns are sent to foundry and placed in the room provided for them.

After use, patterns must be returned to pattern store.

Upon completion of each order, a requisition must be sent to store covering all material used on that S.O. or in the case of a large order, upon completion of each part or section. The foreman keeps a record of his delivery dates upon his copy of the S.O. and checks them up when he sends patterns to foundry. Patterns arriving from outside sources are delivered to the foreman, who then handles them in the same manner as patterns from their own store.

Foundry Foreman

On receipt of a pattern (with foundry tickets) he at once checks it and sees that all core boxes, sweeps, etc., are with it. He hands on a duplicate ticket to his leading chipper. After castings have been taken out of the sand and cleaned, the leading chipper enters the S.O. description and weight of all castings on the foundry daily report forms and marks on each castings its weight and S.O. number. After inspecting these castings the foreman O.K.'s the report and passes it on to casting storekeeper not later than 48 hours after the heat. It is important that all castings from any particular heat go on the report for that date. He also issues stores requisition for all material used, this including pig, scrap, steel, coke, etc. He keeps a record of his delivery dates on his copy of the S.O. or foundry tickets.

Machine Shop Foreman

This foreman has charge of machine shop, blacksmiths and electricians. He keeps a record of his delivery dates on his copy of the S.O. and on completion of orders he notifies shipper and has material moved to shipping point, or in the case of large machinery he requests the shipper to arrange with yard foreman to move to crane or car as the case may be.

Delivery Dates

Delivery dates are arranged by the production department with the foremen of the departments concerned. The foreman notes on his copy of the S.O. the date promised, and he cannot vary this without first consulting the production department. If it becomes necessary to make a later date, the foreman consults the production department before making any changes in his schedule. Rush orders and breakdown jobs are not accepted for immediate delivery, until such time as production department has arranged any necessary alterations to regular schedule.

Casting Stores

The foundry daily report must be filled in not later than 48 hours after each heat and O.K.'d by the foreman before being turned over to the casting storekeeper. The storekeeper, when ready to check this report, notifies the production department when inspection is made. Accepted castings are initialed in yellow and rejected castings in red.

After castings have been inspected and O.K.'d the storekeeper signs the report, showing particulars of all castings accepted that day. In case there are more castings than the S.O. calls for, the particulars of the surplus must be entered on a rejected material report, orders for its disposal being issued later.

Rejected Material

Shop order number and particulars of any material returned as faulty are entered on a rejected material report. Full particulars, the reason, and if the department returning the material makes any claim for labor expended on the particular piece returned, this is all stated and must be O.K.'d by production department. Before this report is sent to main office, the foreman of the department whose material has been rejected must initial the pink copy. The casting storekeeper is responsible for the clearness of these reports. Any castings rejected must be replaced at once, using the original S.O., which must supersede all other shop orders.

Shipper

The shipper keeps a daily report on the form provided, turning in copies to the accounting and production departments every morning. He obtains from casting storekeeper, machine shop foreman or pattern shop foreman, as the case may be, a notification that the material is ready for shipment. He also turns into main office with this report the pink copies of the shop orders completed, and casting cards, covering these shipments.

When an order is completed, or in the case of a large order, when a part of section is ready for shipment, the foreman of the department concerned will notify the shipper on the form provided.

Patterns

All patterns must have a number and be entered in pattern register, except in the case of very small temporary patterns. In case customer has a pattern or B.P. No., that number must be stamped on the pattern in a convenient place. In case of standard stock patterns, these carry a number arranged by engineering department. If at any time it is necessary to alter a pattern, after consulting with engineering department and getting alteration O.K.'d, a note is made in the pattern register describing the alteration. This register is kept by foreman patternmaker, engineering department holding a duplicate and keeping it up to date by comparison each month.

Time Sheets

Time sheets are collected every night

(Continued on page 33)

REJECTED MATERIAL REPORT

_____ 19___

I have received the following faulty material from_____Dept.

Description.

Give number of pieces and weight.

The Reason Given is:

This Dept. claims_____hrs. @____Labour

Pink copy to Main Office. Blue to Production Dept. O.K. Prod'n. Dept.

_____ Storekeeper

Foreman of Dept. whose material has been rejected must initial PINK copy here _____

THE TYPE OF REJECTED MATERIAL REPORT USED.

The Importance of Inter-Shop Transportation

Study Your Present Trucking System—Secure Definite Figures On Your Handling Costs, Then Ask Yourself "Is This the Best I Can Do?"—Others Followed This Procedure With Great Success.

By J. H. M.

THE importance of efficient transportation can never be over-emphasized. This applies both to long and short hauls, but the short haul, or shall we say the inter-plant haul, is perhaps of the greatest interest to the plant manager, superintendent, yes, and even the foreman of each department.

There still exist unfortunately a few who claim: "No, we don't watch our trucking so awful hard, for after all the men pushing the trucks are non-producers." Others will mumble something about their plant being hardly large enough, but in both cases the excuses are not founded on facts. Instead of looking upon the improvement of their trucking system as an expense, they should view the change from the standpoint of investment. Perhaps the very manager who mumbles that the present system of pushing the trucks by hand is good enough for him never stops to think why he himself uses an automobile. Would he consider someone calling for him each morning with a wheelbarrow and pushing him down to the office? Not much, for apart from the curiosity he would arouse, what he wants is speed. He wants to get there, and to get there without DELAY. It is in this word DELAY that the stumbling block lies. A manager refuses to be delayed himself, but how many allow their goods in the plant to be delayed through lack of proper trucking equipment.

I Get Enough

It is very seldom you hear an executive say he is getting enough production—yet I heard this statement made in a careless offhand manner not so long ago. "Would you refuse an increase?" I asked.

"Certainly not," came the reply, "an increase in production would make lower production costs."

This latter remark is, in a nutshell, the best argument in favor of efficient inter-plant transportation.

A good method is to start out in this way. First of all ascertain what time is consumed on actual manufacture, then find out how much time is taken up in handling. For example, a workman might take 4 seconds to obtain a piece of work, 6 seconds for the actual operation and 4 seconds to dispose of it. This means that 8 out of every 14 is consumed in handling. This is a very average condition. I remember one case in point. A certain product was being drilled, and strange to state for over four years 85 per cent. of the time on this operation was taken up in handling. One day a suggestion was made, and later approved of. By placing a convenient tray at the drill, together with a tin chute to a nearby truck body, resting on a lifting truck platform, production was increased over 100 per cent. This is no uncommon incident, but one of hundreds happening all over the country.

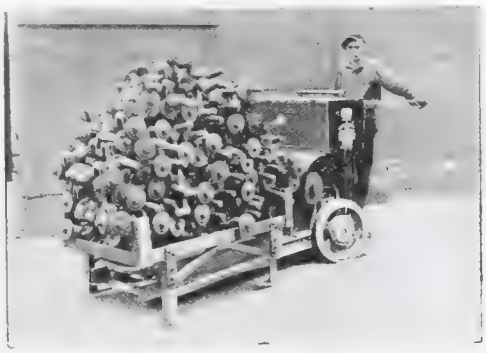


FIG. 2—THE LIFTING PLATFORM TYPE OF TRUCK IN OPERATION.

The example related had to do with actual handling at the machine, but how about the increased production, how was that taken care of? Simply by the use of a truck in the shop which was not half busy enough, so in this case additional equipment was unnecessary. Suppose no truck had existed, what would have happened? Part of the operator's time would have been consumed in moving a hand truck, or some other help would have had to push the finished material away, otherwise congestion would have occurred. In either case the added production value would have been overshadowed by the extra help required.

Another case that came to my notice was on the handling of a certain product through a particular department. The handling cost was .59 per thousand pounds, but after a change in the haulage system had been made, this figure was lowered to .12.

Proper Procedure

On having made up your mind as to the value of efficient transportation, write the firms which handle the equipment you believe will suit your purpose. State your problem frankly, do not make light of it—ask their opinion, also invite them down to look you over, then watch results. Naturally any concern wants a sale, and they will do their ut-

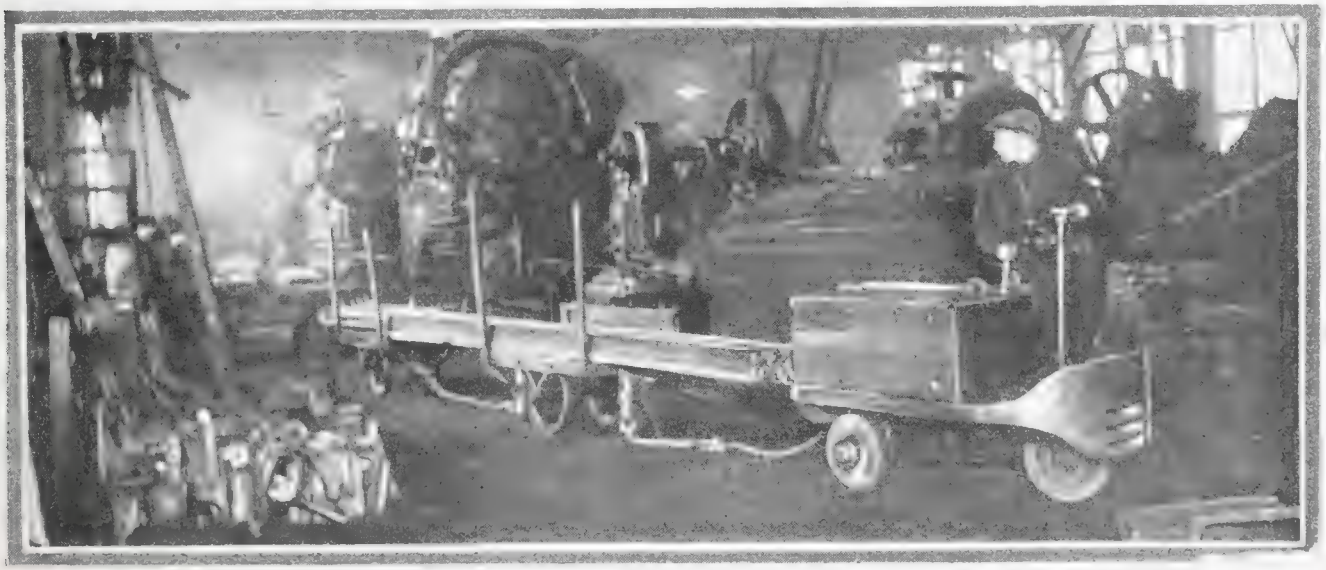


FIG. 1—THIS VIEW SHOWS TO GOOD ADVANTAGE THE USE OF TRUCKS IN THE FORGE DEPARTMENT.

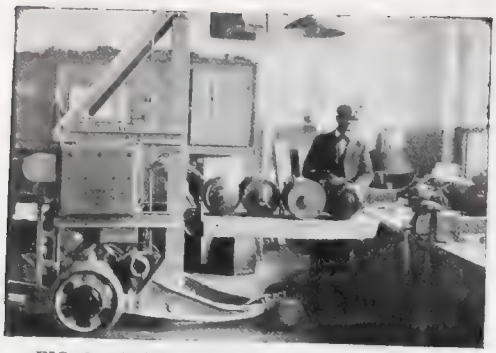


FIG. 3.—A CASE WHERE THE TIERING TYPE OF TRUCK COMES IN VERY HANDY.

most to prove to you, where they claim they can save you money.

In speaking to H. S. Powley, of Powley & Townsley, Ltd., who are the sole Canadian distributors for trucks made by the Automatic Transportation Co., Buffalo, N.Y., I asked him if my statement was correct, viz., that manufacturers will give figures and prove them. His answer is worth recording.

"Speaking for my own particular firm, Yes. We not only give figures and prove them, but keep on plugging till we better them. You know, after you sell a battery of trucks, or even a single truck, your work is only started. If you are content to let it rest there, you've merely made a sale, increased efficiency to a stated figure, made a satisfied customer, and then what?

"To my mind you should follow up such problems—help a firm to really get somewhere—and above all prove to them the maximum efficiency of your particular style of truck. Many a truck is not working to 50 per cent. of its efficiency at the present time. Why?—because the improvement at 50 per cent. efficiency is so great over the old method, that the executive never imagines still further haulage can be handled. Let me cite a case.

"At the Canada Steel Co., Ltd., we installed some trucks, guaranteeing a certain figure. We more than covered that figure, and the superintendent was very well pleased, but not so with us. I told him we could do still better, and in a kindly way I was asked if I was crazy. Had I not made my sale, received my money, then why on earth bother further?

"'Because,' I replied, 'I'm going to show you the real value of careful trucking.' I stuck with the job, studied the conditions existing at the plant in question, then started on a little scheme which worked out as follows:

"Getting the truck operator to one side I said, 'How would you like to make more money?' Need I tell you his answer? I next explained that if he were to get another man to help him load and unload he could make more money. I pointed out that he was to be the other man's foreman, always having it understood, of course, that both he and the new man must be under the superintendent. I asked him to pick out his own man, and he did so, with the result that haulage increased another 50 per cent.

"At this point let me say that it does not pay to put any old dub on a truck as operator. A manager of a firm likes to handle his own car, or if he is fortunate enough, he has a trained chauffeur. In like proportion he should not expect a dub to do as good as a capable workman. For example, the operator on the truck I told you about was a machinist before I made him a truck operator. He didn't want the job at first, but when I showed him he could make more money at trucking than at his trade—well—the rest was easy. I always break in a new operator with the truck empty. I show him the movements carefully, then as soon as he understands them, he becomes the chauffeur, so to speak. I never hurry a man, but let him learn the game thoroughly—but wait, you are writing this article, not me." Laughingly he passed over the reins, so again I speak from my own standpoint.

The Electric Truck

The electric storage battery type of truck is too well-known to require any introduction. There are two general styles in use, first, the carrier truck, which takes its load from place to place, and second, the tractor type, which pulls loaded trucks to any desired department. The principle of design is practically the same in both cases, an electric motor supplied with current from storage batteries doing the driving. Generally the speed of such trucks is so controlled that they cannot travel at more than a predetermined rate. Steering is done by one hand, while the other is on the driving lever. If the driver moves his hand from the lever it immediately returns to neutral and the brakes are applied. However, we are not so interested in the truck design itself, as what it accomplishes, so let us get to some examples of work performed. The following figures were kindly given us by Mr. Powley, and apply to trucks as made by his concern.

First of all, let us study Fig. 1. Here

FIG. 6. THIS VIEW SHOWS ELECTRICAL CONTROL OF A TYPE "T" TRACTOR.

FIG. 5. A TRUCK OF THIS STYLE SAVES MANY A MAN'S BACK.

is shown one of four trucks used by the Massey-Harris Co., Toronto, for hauling material throughout their plant. The truck shown is of the tractor type, and is at present pulling two long hand trucks filled with angles and channels. This concern tells us that not only have the trucks proved of value for speeding the work through the plant, but they have helped to keep all aisles clear in the different departments. Briefly, they wouldn't be without them. They also use the lifting platform type of truck for other purposes, and have another tractor type at their plant in Brantford, Ont. Fig. 2 shows the lifting platform type truck in operation.

Then there is the tiering type of truck. Its uses are varied, but the view shown at Fig. 3 is ideal from a machine shop standpoint. Here we see the work raised to the proper bench level, and all that remains to do is push the work on to the bench. Another good illustration of the same type of truck is shown at Fig. 4. Here is a condition often met with. A high platform level, yet the difficulty is removed without trouble with a truck of such a nature. Lifting castings from the floor or yard is easily accomplished with a truck of the style shown at Fig. 5. Up goes the work on the crane, on to the truck, a pull on the handle and away goes the truck to the desired department.

At Fig. 6 is shown the electrical control of a type T tractor and while we will not go into detail of the mechanical features, enough is seen to appreciate the compactness of the arrangement. We could go on indefinitely illustrating uses for inter-plant trucks, but enough has already been shown to prove their value. For this reason we will content ourselves with one more view, that shown at Fig. 7. This depicts a type AA industrial engine hauling a load of coal. Note that the engine is equipped with a tilting hopper, this making for speed in unloading. The value of such an arrangement is self-apparent, and without going further it is safe to say that such trucks can be made with all types of bodies designed to suit every conceivable kind of material flat or otherwise.

Should readers imagine the examples already quoted to be mere flights of fancy I might say that the names of the

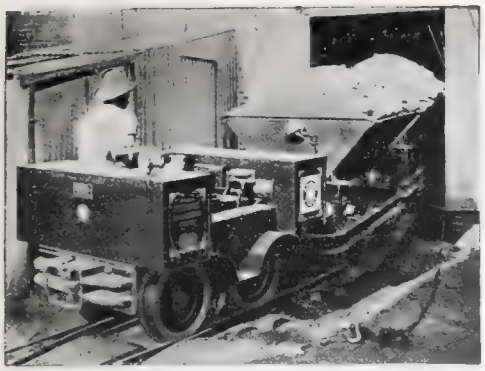


FIG. 7 HAULING COAL IN THIS MANNER REDUCES EXPENSE.

firms using these trucks are available if required, and this is also true of the figures to follow, which are statements made by concerns as to conditions as they have found them, these, of course, dealing with electric trucks of the make already mentioned.

A plant superintendent states, "We are saving $15,000 a year in wages alone as a result of the installation."

A factory manager says, "We find that we can move as much material with one truck as twenty-three laborers."

Another general manager states that he saves $12,000 yearly, and a superintendent who devotes his time to interplant transfer claims that he has reduced confusion and lost motion, and in addition is approximately saving $30,000.

An assistant superintendent mentions that in place of 44 men he uses two, and that he handles his product 100 per cent. faster than formerly.

Another concern reduced their trucking staff 80 per cent., yet get better results. We have used an electric truck 40,000 miles, and its still going strong, writes another.

Here briefly are some other savings: $12,000 yearly, $9,000 yearly, $10,000 yearly, one truck alone saves $4,000 yearly, and one concern goes as far as to say eight horses and eight men were replaced by four trucks.

Surely there must be something to all this? Managers and superintendents do not waste wind telling of things that do not happen. Have you a truck problem? If so, investigate, for by so doing you will save time, worry and considerable cash. The question of inter-plant haulage is a vital one. Give it the attention it deserves.

STANDARD PRACTICE FOR THE SMALL JOBBING SHOP

(Continued from page 30)

between 4.30 and 5 p.m., a new time sheet being left with each man for the following day. The foreman sees that these sheets are filled in at intervals during the day and not left till the last minute, when proper distribution of time is not always possible. The sheets are collected and delivered to timekeeper's office every morning not later than 10 o'clock.

Each of these standard practices is typewritten on a separate sheet, clipped together in a folder and a copy supplied to all department heads and foremen, which, together with the operation and management charts, which are prominently displayed in the main office and works office, make all routine work and operation in connection with the management of the works quite clear.

The idea is to elaborate this by adding additional ones, covering any important subject that may necessitate a standard practice.

Of course, it is important that before a standard practice is put into force, it should be very carefully discussed with all concerned and an opportunity made for suggestions.

When once it is finally agreed upon and becomes law, it should not be deviated from, except under instructions from the manager or some other appointed official, when, if necessary, the practice concerned should be rewritten to cover the new conditions.

The production department register will enable the production superintendent to keep in touch with his orders with the minimum amount of trouble. The procedure is this: When an order is received from the engineering department, it is entered up and delivery date fixed. By checking up each day with the shipper's report and the foundry report, together with personal observation and inquiry, the superintendent is able to see which orders are lagging or where dates require rearranging.

If alterations are made with heavy blue pencil, and orders completed are scored off with red pencil, it becomes quite easy to pick out the unfinished orders. The writer has found that in the small works it is better to have this register in book form rather than on cards. Of course, it is absolutely necessary that no delivery dates be made by any other official, and any changes in schedule must be arranged with the production department.

Two new industries have decided to erect plants in Hamilton, Canada—the Fuller Brush Company, of Hartford, Conn., which will employ about one hundred hands, and the Coffield Washer Company, which will employ about fifty hands at the beginning.

TEMPERATURES

CENTIGRADE AND FAHRENHEIT SCALES

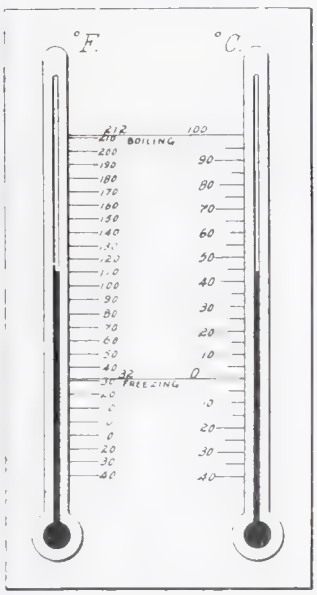
In mechanics and engineering it is often desired to convert temperatures from one scale to another or to find the relative equivalents. On the F. scale the freezing point is at 32 degrees, while on the C. scale it is at zero. The boiling temperature on the F. scale is at 212 degrees, and on the C. scale it is at 100 degrees. It is then evident that on the C. scale the temperature range between freezing and boiling temperatures is 100 degrees, while by the F. reading the range is 180 degrees; that is, a rise in temperature of 9 degrees on the F. scale would correspond to a rise of 5 degrees on the C. scale.

To convert a C. reading to Fahrenheit—multiply the C. temperature by $\frac{9}{5}$ and add 32.

Thus:—60° C $= (\frac{9}{5}\text{C}) + 32 = (\frac{9}{5} \times \frac{60}{1}) + 32 = 140$ F.

To convert an F. reading to Centigrade—subtract 32 from the F. reading and multiply by $\frac{5}{9}$.

Thus:— 100° F $= \frac{5}{9} \times (\text{F} - 32) = 37\frac{2}{3}^\circ$ C.



$$F = \left(\frac{9}{5} \times C\right) + 32$$

$$C = \frac{5}{9} \times (F - 32)$$

Canadian Machinery

Tool Steel Used in Making Miscellaneous Tools

Using High Carbon Open Hearth Steel for Various Kinds of Tools—Composition of Such Steels—How to Obtain Best Results —Heat Treatment Important—Such a Steel Only Has Its Place

By GEORGE PORTEOUS*

THIS subject should be of general interest because of the fact that the purchase of tool steel for general tools, such as hand and pneumatic chisels, shear blades, etc., is a large item in the yearly expense bill of many manufacturing concerns. The substitution of high carbon open-hearth steel in place of the more expensive crucible tool steels in the manufacture of these classes of tools is not a recent departure from established practice, but this subject in the past has not received the serious consideration which it merits.

It is axiomatical that the quality of open-hearth high carbon steel can not be compared fairly to that of the more carefully made electric and crucible tool steels, therefore, it is obvious that the forging and thermal treatment of the lower grade steel must be studied carefully in order to compete against the higher grade steels in the manufacture of miscellaneous tools.

I have often noticed advertisements of special tool steel made into punch and chisel form, driven through steel blocks of from 1 to 2½ inches thick. These illustrations purport to show that the steel from which the punches and chisels were made is of special quality and far ahead of any ordinary tool steel. As a matter of fact, this is not to my mind a quality test at all. A sample of high carbon open-hearth steel can be made into a similar punch, and be treated and drawn through a 3-inch block of medium carbon steel.

From the foregoing we learn that high carbon open-hearth steel can be so treated that it will equal the durability of a so-called superior grade of steel by means of careful and intelligent treatment, and we can also realize that this characteristic also opens up a very large field of usefulness by the substitution of this steel in place of the high grade steels in the manufacture of many kinds of tools.

We have been using high carbon open-hearth steel as a substitute for tool steel for several years and we have been successful in its treatment for such tools as cold chisels, rivet snaps, punches and dies, taps, shear blades, and similar tools. The grade of steel that has proven most successful in the manufacture of these classes of tools has had an analysis of approximately 80 to 100 per cent. carbon, less than .03 phosphorus, less than .03 per cent. sulphur and .35 to .45 per cent. manganese.

Getting Results

To get the best results for a steel of the above composition, great care is necessary in the heating and forging operations as well as in the subsequent thermal treatment. The billet from which the steel is drawn down should be at least twice the diameter of the finished forging. For example, ¾ to 1-inch octagon should be forged from not less than a 1½-inch bar or billet. The forging temperature should be from 1,800 to 1,950 degrees Fahr., reheated as required depending upon the rapidity of the forging operation and the dimensions of the finished bar. As the forging approaches the final stages, the hammering should become more rapid with lighter blows to finish the forging of the steel at a temperature of about 1,350 degrees Fahr., which refines the grain and leaves the steel in better condition for the subsequent heat treatment.

POINTS BROUGHT OUT

That the purchase of tool steel for general purposes, such as hand and pneumatic chisels, shear blades, etc., is a large item yearly, therefore any possible chance of economizing should be taken advantage of.

That high carbon steel can be so treated that it will equal the durability of a so-called superior grade by means of careful and intelligent treatment.

That high carbon steel is used with success as a substitute for tool steel in the making of tools, such as cold chisels, rivet snaps, punches and dies, taps, shear blades and similar tools.

The refining and equalizing process of steel treatment as applied to the forge and heat treatment of percussion tools such as cold chisels, hand and pneumatic, made from open-hearth high carbon steel is applied to the steel in several progressive stages, the success of each stage of the treatment depending upon the proper carrying out of the preceding one.

The first stage in the evolution of a cold chisel is the forging operation which in order to ensure success in the finished product must be done intelligently and with due attention to the proper forging temperature. The steel should be heated high enough to be in a thoroughly plastic condition, approximately 1,850 to 1,950 degrees Fahr. The closer the heat is to the higher temperature the better, so long as a reducing and not an oxidizing heat is obtained. At this stage it is well to remember that when forging the point of a chisel, the edges should not be hammered after the point has been forged thin, because if the steel has been thoroughly worked down to a thin edge on the flat and then turned up and hammered on the edge, the force of the hammering will affect the grain of the steel on the edges but will not penetrate to the center, thereby causing the grain structure of the steel to be uneven. This will cause the steel to develop water cracks when hardened.

The proper method of forging the point of a chisel is to work the steel down to a square taper, as in the forging of a diamond point chisel and then flatten out to the desired width. A little practice will enable a person to gauge the amount of stock required to forge the point of a chisel so that there will be little, if any, grinding to do on the edge. The rough point of the chisel should be trimmed off with a hot chisel immediately following the forging operation when the steel is at a cherry red heat. If necessary the chisel should be reheated.

The second or refining stage of the treatment is done by light blows with a hand hammer, the face of the hammer being dipped in water once or twice during the operation, on the flat of the chisel point when at a dark blood red heat.

The third stage of the treatment is the equalizing of the steel at the point of the chisel. The steel should be allowed to cool down to about 750 degrees Fahr., when the red disappears in the dark, dipped in black oil, withdrawn, and allowed to cool down slowly to atmospheric temperature. The oil should be at a temperature of about 125 degrees Fahr. for this purpose.

If the forging, refining and equalizing operations as just explained have been followed carefully, the grain structure of the steel will be in a state of equilibrium and in perfect condition to be hardened and tempered.

The hardening temperature should be the lowest possible consistent with the holding of the martensitic condition of the structure when heated over the decalescent point of the steel. This would be about 1,425 degrees Fahr. The point of the chisel should not touch water after the first chill. Check the rising temperature in oil when drawing temper by the color method. If an oil tempering bath is used, the temperature for this class of tool would be 490 to 500 degrees Fahr. for a period to be determined by the character of the work to be performed.

In cases where the structure of the

*Supervisor of forge and heat treatment, Minnesota Steel Co., Duluth, Minn.

steel at the points of cold chisels and kindred tools has been impaired by reason of overheating or cold working, it is possible to restore the steel to its original state by upsetting and rewelding the part affected, using a flux of common dry yellow clay. This flux prevents the atmospheric oxygen from finding its way through the pores of the metal and combining with the carbon, forcing the crystalline grains apart, and destroying their cohesion when heating the steel to the high temperature necessary. This, with the subsequent thorough hammering and working, will restore the steel to its original state. The shanks of pneumatic chisels are treated by being heated to 1,450 degrees Fahr., dipped all over in cyanide of potassium, and cooled in oil with no further treatment.

Many of our scientific steel experts will be shocked at the crudity of the above treatment, nevertheless it is the only treatment that gave maximum service on the shanks of chisels used by us for the chipping of hard steel billets.

Adaptability

The adaptability of using high carbon open-hearth steel in the manufacture of pneumatic chisels for chipping hard steel has been tested very thoroughly in the chipping and dressing of shell steel bars and billets. We have tested it against some of the more expensive steels on the market and it has given us just as good service as these high grade steels and as a consequence we have adopted high carbon open-hearth steel exclusively for this class of tools.

The approximate analysis of open-hearth high carbon steel for taps and reamers should be approximately the following: .90 to 1.10 per cent. carbon, not over .02 per cent. phosphorus, not over .02 per cent. sulphur, and .25 to .35 per cent. manganese. The steel should be forged at a temperature of 1,750 to 1,900 degrees Fahr. annealed at 1,425 to 1,475 degrees Fahr. in a muffle furnace or in covered receptacle to prevent access of air, or withdrawn when the proper temperature has been reached and covered with dry lime or ashes.

When the tools have been rough machined they should be equalized as described in a former paragraph. This equalizing process acts as a preventive to the warping of the tools in the subsequent heat treatment. The hardening temperature of this grade of steel is 1,400 to 1,425 degrees Fahr. To obtain maximum cutting qualities combined with toughness and resistance to shock, the best method of hardening treatment is to hold the tap or reamer in the water just long enough to harden the teeth or cutting faces and then immerse quickly in oil and allow the center of the tool to cool down slowly. The oil immersion allows the hard surface of the tool to heat up enough without losing hardness to take care of the cooling strains which would be liable to crack the tool if allowed to cool off entirely in the water.

HINTS OF VALUE

When forging the point of a chisel work the steel down to a square taper, as in the forging of a diamond point chisel. After this is accomplished, flatten out to the desired width. The rough point should be trimmed off with a hot chisel immediately following the forging operation. When the steel is at a cherry red heat the third stage in the chisel's treatment is the equalizing of the steel at the point. The steel should be about 750 degrees and the oil about 125 degrees.

The approximate analysis of open-hearth high carbon steel for taps and reamers should be approximately .90 to 1.10 per cent. carbon, not over .02 per cent. phosphorus, not over .02 per cent. sulphur, and from .25 to .35 per cent. manganese. The steel should be forged at from 1750 to 1900 deg. Fahr., and annealed at 1425 to 1475 deg. Fahr. in a muffle furnace, or some covered receptacle to prevent access of air. Should this be impossible the work can be withdrawn when the proper temperature has been reached, covering the parts with dry lime or ashes.

The drawing temperature is from 400 to 425 degrees Fahr.

The analysis of high carbon open-hearth steel found to give the best results in the manufacture of shear blades for cutting cold metal such as steel plate and bar stock is within the following limits: .85 to .95 per cent. carbon, not over .03 per cent. phosphorus, not over .03 per cent. sulphur, and .30 to .45 per cent. manganese. Steel that has been forged for shear blades should be annealed at 1,450 to 1,500 degrees Fahr., heated evenly in a muffle furnace and allowed to cool down with the furnace.

The hardening temperature is 1,425 to 1,450 degrees Fahr., chill in water and allow to remain in the bath long enough to harden the exposed surfaces, then transfer to an oil bath and allow to cool down in the oil, draw in oil tempering furnace to 490 to 500 degrees Fahr. Allow the blade to remain in oil tempering furnace long enough to ensure thorough toughening. A shear blade of the following dimensions, 1½ x 7½ x 24 inches, should be allowed to remain at the proper drawing temperature for a period of at least two hours.

To secure the best results in service from a high carbon open-hearth shear blade, the center of the blade longitudinally through the hole centers should be left as soft and tough as possible by being protected from the action of the quenching medium. This can be done by putting a bolt through each bolt hole with a washer on each side of the blade and the bolt and washer luted with clay. In the case of large size shear blades, the best method is to use two flat strips ⅜-inch thick and of suitable width, drilling holes in the strips to match the holes in the shear blades, luting with clay and holding them in place with suitable bolts. Care should be taken that the strips do not cover the cutting edge of the blade. In the case of a shear blade 9 inches wide, the strip should be 4½ inches wide. We have never had a shear blade to break either in hardening or in service when protected in this manner.

I have already mentioned that the punch test is not an indication of the superior quality of the steel from which the punch is made, but is rather a problem in heat treatment. This drive test can be made by using either open-hearth high carbon or regular crucible tool steel.

High carbon open-hearth steel can not be made to take the place of high grade crucible steels for certain classes of tools such as some forms of milling cutters and intricate blanking dies because the cost of the workmanship in making and finishing these classes of tools overbalance the first cost of the steel to such a large extent that it would not be justifiable to use anything but the very highest grade of special alloy steel in their manufacture, but high carbon open-hearth steel can be used in the manufacture of tools some of which I have enumerated, and will give just as much satisfaction in service as the higher grade steels. There is another point in favor of the use of open-hearth high carbon steel as against the crucible steels and that is the difference in price. The cost of open-hearth steel is around 3 cents and crucible steel from 12 to 17 cents per pound. This considerable difference in price should be an incentive to the more general use of open-hearth high carbon steel. I have investigated this matter thoroughly and can guarantee that just as good results can be secured by the judicious use of open-hearth high carbon steel with the proper heat treatment as can be secured from the use of a higher grade and more expensive tool steel.

NOVEL USE FOR TRACTORS.

A sudden strike among the employees at the electricity station in a British town interrupted the supply of current to the local factories and thus brought them to a standstill. Help came, however, from an unexpected quarter. One of the factories was engaged on the mass production of tractors for agricultural and other purposes; and within a few hours a number of tractors were employed to supply the necessary power in this factory. Twelve tractors were belted up to a shaft from which several motors were driven as dynamos, this novel installation giving an average output of two hundred horse-power. Other tractors were used to drive machines directly. When the news of this got about, demands for the tractors came from other factories, and the emergency service so provided greatly discounted the effect of the strike.

Uses of Creosoted Wood Block Factory Floors

Material Used—Problems Encountered—Conditions Met With in a Successful Installation—The Requisites for Success—How to Lay Floors Subjected to Moisture

By LAMBERT T. ERICSON*

THE use of creosoted wood blocks for factory floors has been so extensive during the past few years that it is hardly necessary to go into details in regard to the advantages of this type of flooring. Most engineers and architects have come in contact with this material at first hand, so that we will confine ourselves to a discussion of (1) the material used; (2) the problems encountered; and (3) the field covered.

Southern yellow pine has been employed almost entirely for this work, except on the west coast, where Douglas fir and tamarack are used. Long-leaf pine is usually specified, but short-leaf pine is also adaptable for the work. The lumber should be thoroughly air-seasoned before being cut into blocks, and then should be given a preservative treatment with coal-tar creosote oil to preserve the wood from decay. Hard woods, such as gum, beech and maple, can be used, but they are not favored on account of the difficulty in properly seasoning the lumber and the tendency of the blocks to warp and check after they are cut. The coniferous woods are more homogeneous in grain and texture and are consequently more adaptable. Soft wood compacts under service and consequently it is just as serviceable as hard wood, and has the advantage of not becoming slippery under traffic.

It should be understood in the beginning that factory flooring with creosoted wood blocks cannot be grouped under one general heading and specification. The conditions under which the floor is to be used must first be studied and the specifications made to suit. Creosoted wood blocks can be laid to meet practically all factory conditions if the conditions are first properly analyzed. The real reason for most of the trouble encountered with this type of flooring is the fact that wood expands and contracts with various conditions of the atmosphere and the moisture content of the blocks. It is therefore necessary to lay the individual blocks in such a way as to allow for this change in volume, which in extreme cases may be as much as 5 per cent. The individual units in the floor must be bound tightly in place with a binder which will allow this expansion and contraction and which will exclude water from the underside of the floor. As long as the blocks are held tightly and firmly in place and a smooth surface is maintained the floor will wear almost indefinitely, but as soon as they become loose and the surface rough they will break up into sticks very quickly.

*Prof. "Mechanical Engineering."

Conditions to be Met in a Successful Installation

The three most essential requisites for success are: (1) thoroughly air-seasoned lumber; (2) a smooth, solid foundation base; and (3) a waterproof and elastic binder to hold the units in place. In the majority of cases factory floors are dry most of the time; consequently, the lumber should be thoroughly seasoned, in order to keep the shrinkage to the minimum. Blocks cut from green or semi-dry lumber will shrink in volume to such an extent that they will often have to be taken up and relaid. If it is possible to do so, it is advisable to use a concrete base for the installation of these floors. The base should be strong enough to carry the entire load and should be finished smooth and level so that it will not be necessary to use a cushion between the concrete and the blocks in order to secure a level floor and uniform bearing for the individual units.

THINGS TO REMEMBER

Creosoted wood blocks can be laid to meet practically all factory conditions, if the conditions are first of all properly analyzed.

The chief point is to hold the blocks firmly in place, presenting a smooth surface. As long as this condition exists the floor will wear almost indefinitely.

The three important requisites for success are: 1. Thoroughly air-seasoned lumber; 2. A smooth, solid foundation base; 3. A waterproof and elastic binder to hold the units in place.

Floors which are to be subjected to considerable moisture, or to weather conditions, should be laid with ample provision for expansion.

Wherever a cushion is necessary between the concrete and the blocks, it is advisable either to use a mixture of portland cement and sand or a bituminous mastic. The latter is preferable in a great many cases on account of being both waterproof and elastic. It is standard practice to-day to lay the blocks directly upon a smoothly finished concrete without any cushion whatever. It is also customary to give the base a thin, even coating of coal-tar pitch before installing the blocks, so that the underside of the blocks may be thoroughly sealed and made waterproof.

The elimination of cushions and the use of a successful waterproof binder in the joints of the blocks, thereby eliminating the possibility of shifting of the base and a loosening of the units, has permitted a reduction in the depth of the blocks used. Factory floors are now being very successfully installed throughout entire manufacturing plants with blocks as shallow as two inches in depth.

Successful installations may be made on timber and plank foundations in mill-type buildings, but care must be taken to see that the timber in the foundation is sound and that the blocks are afforded a firm and even footing. A bituminous-mastic cushion between the planks and the blocks is now being extensively used and is proving very successful.

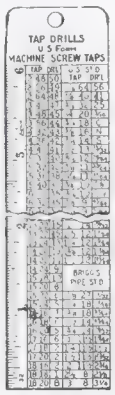
Creosoted wood-block floors are being installed in machine shops, forge shops, foundry molding and core rooms, casting cleaning and chipping rooms, warehouses, leather and paper mills, automobile assembly plants, garages, loading platforms, etc. The conditions in the above work vary from extremely dry to a saturated moisture state. They also vary from low to high temperatures, and in some cases the blocks are submitted to the action of molten metal. The extreme variation in the demands covered by the above list of industries gives a fair idea why it is necessary to study the individual job at hand and draw a specification to meet the particular work.

For ordinary factory purposes the proper treatment for the blocks is six pounds of creosote oil per cubic foot of timber. This is injected by the Reuping process and is sufficient to preserve them from decay. When they are to be subjected to considerable moisture or to the weather, they should be treated with twelve pounds of oil per cubic foot of timber by a combination of the empty- and full-cell processes. This extra amount of oil insures better waterproofing of the blocks.

Floors which are to be subjected to considerable moisture, or to weather conditions, should be laid with ample provision for expansion. It is good practice to provide ample space between the individual units to take care of this expansion. These joints should be flushed full of a waterproof, elastic binder, which should preferably be coal-tar pitch of a consistency which will not soften up under atmospheric or room temperatures. Coal-tar pitch has proven the most successful binder and filler for creosoted wood blocks, as it is a derivative of the same base as creosote oil, and thus readily unites with the oil in the blocks.

Have You Tried This Contest Yet? If not--- Do so Now

Below will be found twelve references to advertisements in this number. To the sender of the first correct set of answers to these we will forward one of these scales.
To win one is not difficult, and at the same time you will add to your store of knowledge. Read the details given below.



The scale is 6 in. long and is made from finest quality steel. One side is marked in 32nds, the other side in 64ths. A table of decimal equivalents is also stamped on one side, and a table of tap drill sizes on the reverse side. This scale is well worth securing.

What You Have to Do

We publish every week a number of interesting facts or statements selected from the advertising pages for that week. The selections for this issue are given below. Read these through, then turn to the advertising section and see if you can pick out the advertisements to which they refer. The work is interesting, it will train your powers of perception and of memory, it costs you nothing, it will make you better acquainted with the various lines of machinery and tools in the market, and with perseverance you are bound to win one of these useful scales as a prize.

This week V. L. Arnott is the winner. Three other readers forwarded correct lists, but lost out in the elimination test, these being John McGachie, Jr., Woodstock; George Land, Peterborough, and Chas. E. Mars, Brantford.

CONTEST FOR APRIL 14TH ISSUE

Contestants are required to write us, stating to which advertisements we refer in this number.

1—How to save floor space.

2—Something that has a push button control.

3—How to solve the problem of handling small lot of various shapes and sizes.

4—Something that is designed with a thorough understanding of present day requirements.

5—Where to get something for any purpose or pressure.

6—How to economize in steam.

7—Something that will appeal to those interested in furnace design.

8—How to obtain close regulation of what?

9—A case where a hollow milling tool proved well worth while.

10—Something that is easier and less expensive.

11—How to secure three important features, these starting with L, G, and L respectively.

12—Something that acts as an incentive.

These are Correct Answers for List from March 24th Issue:

1—Nicholson File Co.

2—Hamilton Gear & Machine Co.

3—Imperial Oil Co.

4—La Salle Tool Co., A. R. Williams

5—Roelofson Machine & Tool Co.

6—Skinner Chuck Co.

7—International Business Machines Co.

8—Cleveland Pneumatic Tool Co.

9—Kearney & Trecker Co.

10—Aurora Tool Works

11—Shore Instrument Co.

12—Trahern Pump Div., George D. Roper Corp.

Closing Date for This Contest is May 5th

WHAT OUR READERS THINK AND DO

EYE BENDING FIXTURE

By L. GEORGE

THE drawings herewith illustrate a fixture used in the forming of the double eye on hinges of about 9-32 inch diameter on the forked end of the piece shown. The material is blue annealed sheet steel of No. 14 gauge, and the operation is performed on a light power press of 3-inch stroke. Attached to the ram of the press is an upper bolster having a rear boss that carries the upper end of the round steel plunger A. A nut on the threaded part below the boss allows of vertical adjustment and takes the upward thrust. The lower end of the plunger slides in a steel bushing set into the lower bolster. The middle portion of the plunger is milled away for the cutting of a rack, this having 15 teeth of 10 pitch, with a face of about one inch wide. This rack drives the short end C of a double quadrant which rocks about a fulcrum in detachable bearings. The large end D of the quadrant is forked to straddle the work, the sector of each fork having teeth to mesh with the pinion E, each of these pinions has its own trunnion, bearing and collar. The right hand trunnion is bored to take the 9-32 inch sliding pin with a rounded end, which is normally supported in the left hand trunnion by means of a spring attached to the hand lever G. Between the two pinions lies a hardened steel pin or roller H, also 9-32 inch diameter, which has its bearings in aligned holes in the pinions, in which it is free to roll. This cross pin is located at a distance from the centre to suit the thickness of the stock used, and is retained endwise by the diameter of the trunnions. The pinions are made separate from the trunnions to make alignment of the cross pins easy. A short steel block projects in front of the pinions and carries two pins K, which act as guides or gauges for the blank hinge.

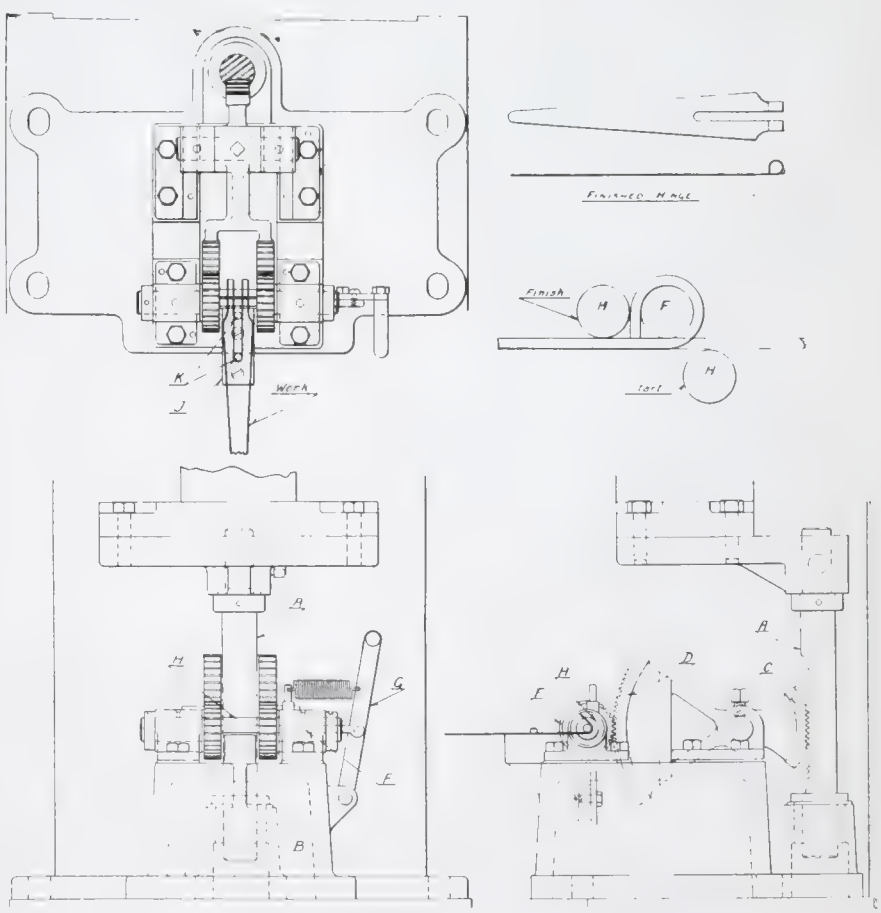
The principle of operation in the forming of the pin can be followed by study of the drawings, the enlarged sketch showing the start and finish positions of the forming roller. With the ram up, the position of the quadrant brings the forming pin H below the line of entrance of the stock, which passes under the central pin and over the pin H, the slot in the hinge blank being located over the pins K. The downward movement of the ram causes the quadrant to move the pinions and the forming pin H forms the stock about the centre pin F, the radius of the quadrant arms being such that the desired angle is traversed in the forming operation. This gives an eye that is only three-quarter circular, but for the purpose for which the hinge is used it is quite sufficient. The upward movement of the ram reverses the mechanism and there is enough spring in the stock to allow the pin F to be withdrawn freely.

FORCED FITS AND SHRINK FITS

By W. S. STANDIFORD

IN machine construction and factory repairs, the method of holding wheels on shafts by means of a forced fit instead of the usual method of securing the parts to be held together by means of a key does not seem to be used to the extent that it should, considering the excellent results obtained with gear wheels, etc., that are subjected to heavy vibration. Pinions held on the ends of shafts by a key will not stand jarring for any length of time, as sooner or later they cause trouble by getting loose and coming off their shafts. In cases where the shaking and pressure exerted upon a pinion is continuous, the latter will remain fast upon its support for a much longer length of time than where the motion is intermittent and jerky as the heavy thrust and leverage soon forces out a key.

Two keys, put upon a quarter circle from each other, will enable a pinion to remain longer on a shaft; but the writer has found out by experience that where continuous running machinery is desired that gives the least amount of trouble to a factory's repair forces, it is much better to force a gear wheel on a shaft



DETAILS OF THE EYE-BENDING FIXTURE.

by hydraulic pressure, no key being needed in this case, as a pinion or gear wheel pressed on in this manner will remain until it requires to be removed by reason of worn teeth, removal being easily and quickly effected by cutting a slot in the bottom of a tooth and forcing a wedge in slot and knocking the wheel off with a hammer. In making press or forced fits, the part that is to be driven must, of course, be larger in diameter than the hole which receives it, but the difference in regard to such press fits is not so great as some machinists think should be the case, as all that is needed is to have the grip between the two metals sufficiently tight so as to prevent the parts from coming off. Any heavier pressure used for work of this character puts a strain upon the metal around the hole which will cause a cast iron pinion to break suddenly while it is in action. The usual practice among machinists in doing work of this kind is, to judge the proper amount of oversize allowance by the feel of calipers; but this is a very uncertain method as errors are likely to be made in judging sizes.

The correct method of taking such measurements is by means of inside micrometer calipers, used in the hole, and outside micrometer calipers to find the shaft size. This puts all measurements upon an exact basis, the worker knowing at all times just what allowance has been given in thousandths of an inch, instead of the slipshod caliper feel and its guesswork as to the proper amount of oversize required. A mechanic always gains by doing all work, whatever its character may be, as carefully as possible, as bad habits once formed are hard to break, and often lead to spoilt work. There is a limit to the sizes of articles made with forced or pressed fits, which is due to the fact that as the diameter of a shaft and hole in a pinion increases, more powerful hydraulic apparatus is required to press them together, so that a point is soon reached where it would not pay to keep an expensive and powerful machine around a shop for only occasional use.

Simple Formulae

As a general rule, force fits are mostly made on such small objects as crank pins, car wheel axles, repair work and lathe and other machine construction parts that require to be held very securely. In judging the proper allowance for a press fit, several factors have to be taken into consideration, viz.: The thickness of metal surounding the hole, kind and quality of material of which the parts are made, the size of the work and also smoothness and accuracy of bore and shaft that are to be fitted together. However, as a general rule, to make a press fit of the greatest possible strength, there should be a difference in the sizes of the parts to be fitted of from two to three thousandths of an inch for each inch of diameter of the article. The following formula will serve to give an idea of the pressure in tons required for making forced fits for different sizes of shaft diameters. The required pressure in tons will be the fit allowances in thousandths of an inch multiplied by the diameter of shaft in inches and also by the factor of 1½.

As an example: Suppose that a gear wheel is to be forced on a 5-inch shaft, the press fit allowance being .002 for each inch of diameter. 5 x .002 = .010, the latter being the total allowance, and the pressure in tons will be 10 x 5 x 1½ = 75 tons. On smaller diameters of shafts where an extra heavy grip between the parts is desired, the larger figure of .003 can be used. Take the case of a 2-inch shaft, 2 x .003 = .006 the allowance, and the pressure in tons will be 6 x 2 x 1½ = 18 tons. It will be apparent from this that if the allowance figures given in both of the above examples were adhered to for large sizes of shafts that the necessary pressures would be very great and beyond the appliances found in most shops. To show this clearly, we will suppose that a 15-inch crank pin is to be fitted into its disk. Using an allowance of .002 inch x 15 inches = .030 the allowance, multiplying 30 x 15 x 1½ = 675 tons pressure needed to do the work. Very few large factories possess the facilities for obtaining such heavy pressures, which make extra tight fits that are unnecessary, as all that is required is sufficient pressures so as to make the parts hold together. In practice, for a shaft of 15 inches diameter, it will be found that .010 inch press allowance will be sufficient, the tonnage necessary to force them together being much less. Some mechanics taper the parts to be fitted together, thinking that tighter fits will result. This is bad practice, because the tendency of a taper fitted part to become loose under vibration is always present, and once it loosens, the entire fit frees itself, taking very little axial movement to do so. On the other hand, a taper fit does not abrade the surfaces of the parts pressed together to the extent that a level fit does. In order to prevent abrasion in work of this kind, it is advisable to lubricate the surfaces with white lead mixed with a little lard oil. It is best to keep the surfaces as smooth as possible so as to allow for renewing gears, etc., on the same shaft when they are needed.

Old wheels which have been pressed on and off shafts require a far greater pressure when being forced on another one. This is due to the fact that the metal has become surface-hardened by the pressure which it has already sustained, and on this account it takes double the pressure to force it on a shaft as contrasted with that of a new wheel of the same shaft diameter. Shrink fits are used in cases where the greatest possible binding effects are desired, they being used extensively by machinery manufacturers and also in railway locomotive shops for putting tyres on the driving wheels of engines, etc.

The allowance for a shrink fit depends to a great extent upon the thickness and amount of metal around the hole, as this has a great influence upon the stresses in the hub at the bore of a wheel and shaft that has been put on by shrinkage. The higher the heat of the outer member, the greater the shrinkage allowance, as the expansion is greater when a piece of steel is heated to 1,200 degrees Fah. than the same metal would have if it were only heated to 800 degrees. It is thus possible by this means to control the amount of adhesion between a wheel and a shaft put together by the shrinkage method; but in practice, there are limits beyond which it is not safe to go, on account of the mechanical stresses set up when the metal is cold. Should the shrinkage allowance exceed the elastic limit of the steel, either a permanent set will occur, with the metal around the hub of the wheel in a state of strain that is likely to develop into a crack by jarring at its weakest point, or the pressure on the hub may be so great that its ultimate strength is exceeded and it will burst after the shrunk parts are cold.

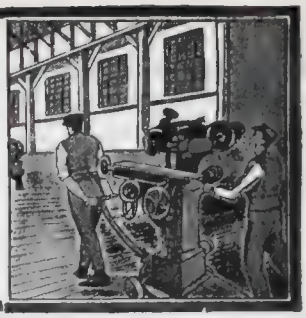
For the general run of machine work, an allowance of about .004 of an inch for each inch of internal diameter of a hole in a wheel will give satisfactory results. On account of their large diameters, railway locomotive tyres are shrunk on with an allowance of from 1/64 to 1/32 inch per foot of diameter.

TANK STEEL.

Tank steel has been defined by the Association of American Steel Manufacturers "as a grade to be used for ordinary fabrications or for structural purposes where no particular stresses are required. It should be free from "surface defects." The reason for making this definition lies in the fact that, since the outbreak of the war, a great deal of "tank steel" has been specified for purposes for which such steel was unsuited and then has had attached to it requirements that would throw the material into a higher classification without, of course, expecting to pay the extras required by such higher classification.

The ruling of the committee is, further, that if the buyers' specifications stipulate a tensile test from each plate as rolled, the material shall be classified as flange steel. Further, that if a flange steel purchase specifies a homogeneity test in addition to naming chemical and physical properties, the material becomes firebox steel. Again, that if the steel plate order carries specifications with regard to phosphorus and sulphur limits equivalent to the firebox grade, the steel shall be regarded as firebox steel unless the chemical tests are modified.

DEVELOPMENTS IN SHOP EQUIPMENT



CAR WHEEL LATHE

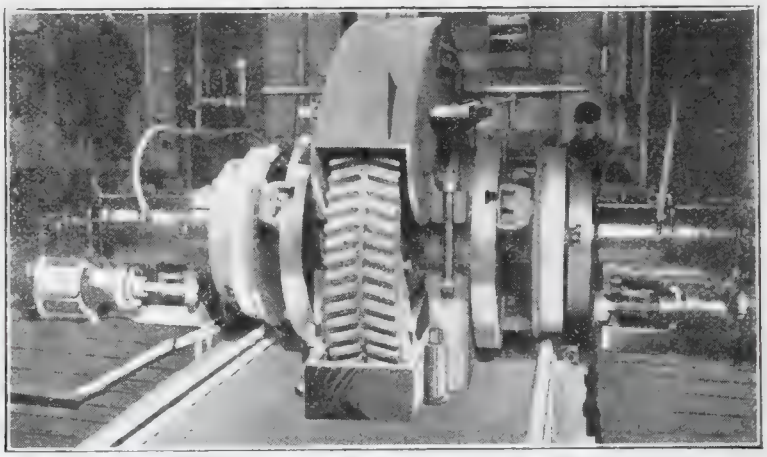
The John Bertram & Sons, Co., Ltd., Dundas, Ont., have recently installed in the C.P.R. shops, Toronto, Canada, a machine that is a new departure for this section of the country. This new machine tool is known as a No. 5 car wheel lathe of center driving type. As will be noted from the three photographs, it is of very rugged construction, and following are some of the features incorporated.

The tool will turn wheels from 26 inches to 42 inches in diameter on the tread. It accommodates the largest M.C.B. axles with outside journals up to 6½ inches diameter, and will take axles up to 9½ inches diameter with inside journals. The maximum distance between centers is 91½ inches; between tailstock faces 96 inches.

The large powerful drive in the center is of particular interest. The steel central driving gear and pinion are of the double herringbone type. Of course, for transmitting heavy torque, as required by this class of work, the herringbone style of gear is ideal, as its construction eliminates all end thrusts and is very smooth in operation, due to the spiral action of the teeth.

The central driving gear is mounted on a spool which revolves in large bearings in the bed. This spool has two faceplates that carry the drivers, and it has an opening of 10 inches to receive the axles. The driving gear is equipped with a patented hinged segment which operates automatically. It closes and locks as the wheels are rolled into the lathe, and unlocks and opens as they are rolled out. The operation of the segment requires no manipulation on the part of the workman.

The wheels are rolled into the lathe on short tracks as shown. A power operated elevating device quickly brings the work up to proper height for the split bushings to enter the tailstock sliding spindles. This elevating device is driven by a separate 5 H.P. constant speed motor.



THIS GIVES AN IDEA OF HOW MACHINE LOOKS WHEN IN ACTUAL USE.

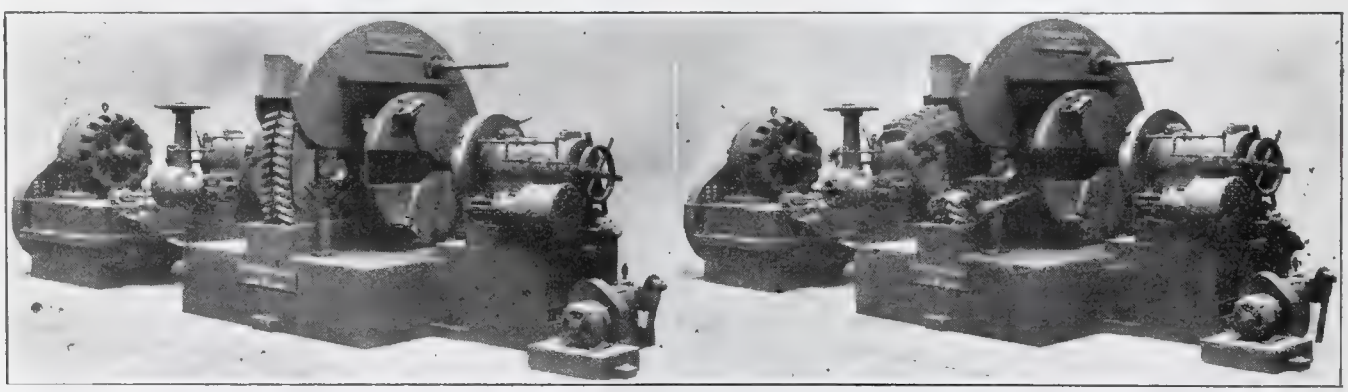
Tailstocks

The wheels are centered by tailstocks which are moved on, and clamped to the bed by powerful air cylinders. These tailstocks are under perfect control, air valves being within easy reach of the operator. For wheels with outside journals collapsible bushings are used that fit over the journals, and are tapered to fit the tailstock spindle. This method insures the tread of wheels being concentric with the journals. For wheels with inside journals, centers are used.

Each faceplate of the driving spool is equipped with three patented semi-automatic drivers, which engage the inside of the wheels near the circumference. These drivers are tightened by hand and exert a uniform pressure on the wheels. The tailstock faceplates are provided with independent chuck jaws which engage the outside of the wheels and support them against the thrust of the semi-automatic drivers already mentioned. This guarantees that the wheels are held with absolute rigidity, and chatter is eliminated; at the same time all torsional strains are relieved.

Tool Rests

The tool rests are equipped with patented pneumatic clamps, these enabling the operator to change and clamp his tools in a few seconds without the aid of a wrench. The tools are clamped by means of a wedge action which forms a positive lock, independent of the air pressure. The tool slides have in and out adjustment for setting depths of cuts,



TWO VIEWS OF THE CAR WHEEL LATHE, ONE WITH DRIVING GEAR CLOSED, THE OTHER IN AN OPEN POSITION.

also hand longitudinal traverse. Slide wearing surfaces have hardened and ground steel plates to resist wear due to the excessive tool pressure. The tool slide screws are fitted up with ball thrust bearings, and the rests can be swivelled to provide for the taper of the wheel treads.

The power feed is obtained by direct gearing and is positive in action. The range is from ⅛ inch to ⅜ inch per revolution of the faceplates. There are 6.4 feeding strokes per revolution of the face plate, this giving practically a continuous feed.

The machine is equipped with a simple calipering device by means of which the operator can readily size both wheels to equal diameter. There are no exposed gears on the machines, these being suitably guarded, and all driving gears are made of steel. The driving spool is fitted with guards and wipers to prevent chips and dirt from getting into the bearings. Wipers are also attached to the tailstock to keep the tracks free from chips and dirt. The tool slides are also suitably guarded.

The Drive

A 50 H.P. motor of 3 to 1 speed variation is used for direct current drives, while a 50 H.P. motor through gearing by which six faceplate speeds are obtained is used in the case of alternating current. Push button control is adopted, the panel being located at the most convenient position for the operator.

The regular equipment with this machine consists of calipering attachment, wheel elevating device, pneumatic tool clamps, set of three semi-automatic drivers for each faceplate, five sets of bushing for different size axles, tailstock traversed and clamped by air, push button control, and a set of eight tire turning tools.

Speaking to the operator of this machine, Canadian Machinery asked his views on the subject of vibration. "There is no such thing with this tool," was his answer, and watching it in actual operation we could not help but agree with him. Speaking on production, he claimed that ½ hour per set of wheels was a pretty fair average. In Fig. 1 is shown the machine with main drive gear closed, while Fig. 2 shows the gear open ready for entering the work. Fig. 3 depicts the machine in actual operation at the C.P.R. shops.

AN INTERESTING PIPE-BENDING MACHINE.

The problem of bending wrought iron pipes to various degrees and getting the bend without distortion of the pipe has always been an interesting one. Many devices have been introduced to achieve the desired result, and we recently had the opportunity to see one of these at work. The machine in question is owned and operated by the Tube and Pipe Bending Co. of Ontario, St. Nicholas St., Toronto.

The device is made in two sizes, the smaller size being used for pipe up to 2-inch diameter, while the large machine can handle up to 6-inch extra heavy. The bending is, of course, carried out without any heating of the pipe.

The accompanying photograph will give a good idea of the machine and the principle on which it works. The drive from the belt pulley is transmitted by a worm to a worm wheel revolving in a horizontal plane underneath the table. On the table is mounted the form for bending, and these forms are, of course, made to accommodate the various sizes to be bent. The pipe to be bent is placed in the jaws of the vise and is run through between the form and vise the necessary distance to form the bend. The mandrel carried on the table is then run into the pipe just as far as is necessary. A series of stops on a quadrant under the table can be set to any number of degrees that may be required. When the pipe is set, the operator presses a pedal, which thows the head carrying the mandril into gear with the revolving worm, thus turning the head and mandril, and, of course, the pipe, through the arc previously settled. When the stop is reached, the machine disengages automatically. The mandril, owing to the path described by the table, automatically draws out of the pipe as the bend is formed.

The machine can be used to put several bends in a pipe, and we saw a number of exhaust pipes for automobiles which contained no less than five bends. One great feature with a machine of this kind is that, once it is set, it can produce any number of absolutely identical bends. This makes it especially useful where large numbers of pipes must be bent to a uniform standard. We had an opportunity to examine some four-inch pipe which had been bent to about 60 degrees, and there was no sign of any wrinkles or distortion on the inner side of the bend. A large number of bends on extra heavy pipe for marine work were performed on the large machine during the shipbuilding activities recently, and were all passed by Lloyd's surveyors.

We understand this machine is fully protected by patents in Canada and the U. S.

BENDING AUTOMOBILE EXHAUST PIPES.

SHEET STEEL PULLEY

A new design of sheet steel pulley has been placed on the market by the Worcester Pressed Steel Co., of Worcester, Mass. The pulley is so constructed that it presents a smooth surface on each side, being free from spokes and hubs, thus almost eliminating the possibility of danger to the workmen, and the creation of air draft. It is light and strong and is said to be easily removed or placed in position. These pulleys are made in sizes ranging from 6 to 18 inches in diameter and with any width of face.

SIZE BLOCK FOR SETTING TOOLS

An adjustable tool for the setting of machine tools is now being offered to the trade by M. B. Hill, of Worcester, Mass. The top gauging block has three steps and moves upon an inclined surface on the base. Through a T-slot in the base a bolt extends up into the body of the top block, the upper end of this bolt having a tapered hole into which the end of a screw, passing through the block, enters. This screw is provided with a knurled head, a slight turn of which is sufficient to clamp the block in any desired position.

ADJUSTABLE COPING SAW

The Consolidated Tool Works are now making a coping saw in which the blade can easily be adjusted to any desired position and quickly locked. The means of setting are so located that adjustments can be made without altering the position of the hands when using the tool. The frame is nickel plated and polished, and the handle is made of wood and black enamelled.

CANADIAN MACHINERY
AND MANUFACTURING NEWS

Published in the Interests of the Machinery, Manufacturing, Iron, Steel, and Metal Working Industries.

Member of the A.B.C. Associated Business Papers and Can. Nat. Newspapers and Periodicals Association

B. G. NEWTON, Manager
A. R. KENNEDY, Managing Editor
J. H. MOORE, Technical Editor
T. H. FENNER, Associate Editor
J. H. RODGERS, Montreal Editor

SUBSCRIPTION RATE

Canada, $4.00, United States, $4.50, Great Britain, Australia and other colonies 17s. per year, other countries, $5.00. Single copies 25c. Advertising rates on request.

THE MACLEAN PUBLISHING COMPANY, LIMITED
143 UNIVERSITY AVENUE,
TORONTO, CANADA

JOHN BAYNE MACLEAN, President
H. T. Hunter, Vice Pres. H. V. Tyrrell, Gen. Mgr.

Let the Steel Corporation Act

THE steel market in this country and the steel market in the United States is about as ragged as anything could be imagined.

For the ultimate consumer, a ton of steel is a ton of steel, and yet there seems to be no end of variations to the price at which he may purchase.

The United States Steel Corporation is supposed to be selling at a fixed schedule, based on the list in operation under government control on March 21, 1919. Yet the market hears plenty of stories of the Corporation meeting prices that are named by some of the independents in order to hold its business.

This paper is not charging that this practice is being followed in many cases, but the incident is used here to show that there is no confidence even in the present schedule of the United States Steel Corporation, and as far as the independents are concerned, there have been so many prices peddled in Canada that it is quite within the range of absolute truth to state that there is no recognized steel market price at the moment.

Under such a condition, the steel mills and the steel warehouses, and any branch of industry into which steel enters largely as a basic material, knows full well that buying is going to be carried on on an ounce for ounce basis. Absolute needs are attended to, but beyond that the buyers are not going, nor will they go.

The independents have made a move to strengthen the situation now by withdrawing, or threatening to withdraw, certain prices they have named in this district. They cannot strengthen the market in this way. They have done much to muss the market up, but it is hard to see where their hand comes in in the "clearing-the-air" process.

The United States Steel Corporation can do it, and they should do it. Canadian Machinery does not urge that the announcement of a new schedule by the United States Steel Corporation would result in an increase in the tonnage sent to the mills under present conditions, but it would set a standard, and fix something around which the market could build for the future. Right now there is nothing to which the steel world can look with any degree of stability. Even the much-talked-of schedule of the Steel Corporation is not regarded in Canada as the absolute selling price of that organization.

It seems likely that the Steel Corporation will move shortly, and the steel market, and the machine tool industry to a very large extent, awaits the announcement. The Corporation can give that much needed stability to the market by announcing its new schedule. It can be done by no other agency, and it does appear as though the time were fully ripe for the Corporation to act.

ONCE more the Montreal scrap metal dealers have risen and whacked down the prices which they might possibly pay in case they might possibly buy something that they might possibly sell to some concern that might possibly have some use for it.

But the coming of spring, or the opening of navigation, or the injection of new courage of some sort or other, has caused the Montreal dealers to apply the honorable arts of subtraction and division on the scrap list. And when said list was handed its hat and coat and told to go out and walk around, its friends of former days knew it not.

For are they not offering $6 per hundred pounds for copper which in war days was scarce at $20? Likewise boiler plate is wearing a $10 suit instead of a $27 outfit in war days. And heavy melting steel is clad in a $9 design against the haughty $24 of 1918.

Some Good Issues Coming

Following out its policy of keeping readers well informed of coming events in its editorial pages, Canadian Machinery presents the following for the coming weeks:

In the April 21st issue there will be an article on "Broaching." This will embody various examples of work performed, together with production data. This practice, one of the more recent developments to be followed in this country, has come into the realm of milling, drilling, slotting and keyseating operations.

April 28th will find the leading article dealing with methods of efficient threading. Here again the interest will be very general in this article. Various examples, well illustrated, will be shown under actual production work.

On May 5th, "Surface Grinding" will be the leading article, and it may be there will be something on your problem.

"Roller Bearings In Industry" will be featured in May 12th, and a number of actual applications are to be shown.

In addition to the above we have other good articles on various phases of machine shop practice which will appear throughout these four issues. These are all practical machine shop articles. You can hardly afford to miss them.

The Problem of the Railroads

HAS over-organization on the part of railroad workers forced a system on the railroads that is too hard and too complex for them to finance successfully?

The Boston News Bureau brings out the following, which has received wide circulation on both sides of the border:

"When a railway engine goes to the shop for repairs these days, men of three, four, even of five crafts, have to be used to do what the men of two crafts, and even of one craft, did four years ago. When a locomotive headlight generator has to be removed nowadays, six men have to be employed to do what, after all, is a simple job—an electrician with his helper, a sheet-metal worker with his helper, and a machinist with his helper. Four years ago, two men, a machinist and his assistant, did the whole job.

"When a railway engine boiler springs a leak three craftsmen, each with a helper—under the rules that now regulate railway labor—have to be employed to make the necessary repairs.

"A sheet-metal worker, with a helper standing by to hand him his tools, will loosen the jacket; a locomotive carpenter, with another assistant standing at his elbow to handle his tools and pass them to the skilled workman, will remove the lagging; then a boilermaker, with a third helper at hand to wait upon him, will caulk the leak; the carpenter and his helper will replace the lagging, and the sheet-metal worker and his assistant will then tighten the jacket. Six men, three skilled and three semi-skilled, have waited their turns and stood round in each other's way, whereas a good boilermaker and his helper could have done the job as well and quicker. If a boiler check has to be changed, two men have to do now what one man used to do.

THE GREAT EYE REMEDY.

The Conditions Four Years Ago

"Four years ago, an ordinary handy shopman could change a nozzle tip in the front end of a locomotive; he could do it to-day if the rules would permit it. But the rules require that six men shall be employed to do that small task—a boilermaker and his assistant, a pipeman and his assistant, and a machinist and his assistant.

"These are all railroad shopcraft jobs. All the workmen are highly paid. All belong to the skilled labor classifications. For each illustration here given, a hundred more might be cited, all calculated to show just what the railroads of the United States are up against."

Advices from Germany state that firms are again putting on the "Made in Germany" mark. German industry is gaining strength every day, and that strength is being aided and helped by just such industrial crises as are being forced in England now.

* * *

Some men succeed because they don't know when they're licked.

* * *

According to reports reaching this office, the scrap metal market in Scotland is shot to pieces. But the scrap situation in Ireland remains active.

* * *

One dealer handled twice as many orders in March as February, but total sales showed an increase of only 15 per cent. Yes, but think of the impetus that sort of buying is giving to manufacturers of wrapping paper, twine and shoe leather.

* * *

A Toronto machine tool dealer submits this one: "At one point on the way down town I saw a number of pickets trying to keep men from going to work. Down at the Government employment office there was another group out looking for work. Now, how far are we going to get on that basis?"

* * *

This Canada of Ours

New York *Sun*: Canada to-day is unique among the great nations in that she has no serious labor troubles, and in that she appears to be effecting the difficult process of readjustment to after-the-war conditions as painlessly as may be. Montreal reports that in most cases where wage reductions have been necessary they have been made without friction, and that this holds true of the Pacific coast and the Middle West, as well as of the more industrial Ontario.

The attitude of the Dominion and Provincial Government toward business has been helpful, but, fundamentally, such successful readjustment must be due to the exercise of plain common sense on the part of both labor and capital. It is not the first time that Canada has set an example worth studying.

One thinks of Canada as primarily an agricultural nation, and it is still true that her wheat and other grains outrun any other commodity. But the Dominion has turned more and more to manufacture, and its industries grow at a tremendous pace. Doubtless the growth may continue as further water power is put to use, and more resources in coal and minerals are opened up and her network of railroads extended.

MARKET DEVELOPMENTS

Stability Needed In The Steel Market

Several Promising Inquiries in the Markets—Some Word is Expected Soon From the U.S. Steel Corporation—More Orders Being Taken in Order to Get the Same Turnover as Formerly

THERE is a growing feeling in the steel market that it is high time for the United States Steel Corporation to make some announcement regarding its schedule. This has been in effect since March 21, 1919, and conditions have changed very materially since then. Then the market has in it many stories tending to show that this schedule of the Steel Corporation is being shaded to meet competition. The Steel Corporation is the one agency that can lend any degree of stability to the market. Its announcement, were it to contain reductions, might not start any buying at all, but it would serve the very good purpose of setting some standards around which the markets of the future weeks and months might be built. At present, any such standard is entirely lacking, and the market is ragged as a result.

During the week several independent steel mills have withdrawn low prices they have been quoting to Canadians, and this has lent a little strength to the situation. Buying in the steel and iron world is still carried on on a very confined basis. Actual wants are attended to, but not a pound over in most cases. Conditions are not favorable to heavy buying.

The machine tool market continues to receive a number of inquiries, and many of them will undoubtedly be turned into business. In this field the machine tool houses have a new problem to deal with, in that they find it necessary to watch closely the credit of some of their former customers. Collections are reported as being more or less spotty.

Small tools are being sold sparingly. One dealer reported that during the last month he had made twice the number of sales, compared with February, yet the actual increase in his turnover had been only fifteen per cent.

The scrap metal market continues as it has been for months now, at about as low an ebb as possible. The volume of business moving is very small, and there is nothing in sight to indicate that an improvement is imminent.

MONTREAL DEALERS ONCE MORE PUT THE AXE INTO LOWLY SCRAP PRICES

Special to CANADIAN MACHINERY.

MONTREAL, April 14.—Those in the trade who, in the closing days of the old year, anticipated a spring revival of normal activity, now look for business revival still farther ahead. Nothing has developed that gives pronounced encouragement to an early revival of active industry, although some reports seem to foreshadow a gradual betterment. In speaking of trade one dealer here remarked that "the year to date has shown steady improvement. January was quiet, February was more so, March showed a gradual increase from week to week, and if April continues to show returns like the first week, we will have the best month in nearly a year; not the turnover we had a year ago, but a substantial increase over any of the previous six months." In commenting on the recent reaction of the U. S. steel market and the advance in prices on certain classes of steel, one merchant stated: "It is difficult to see how any other action could have been taken. There is little doubt that many mills, particularly the smaller of the independents, had to operate on a very close margin of profits, if not at a slight loss. It is quite evident that, with all the cutting of the past six months, the volume of business placed has not shown any marked increase. A comparison might be given in the quotation on sheet bar billets, which at the moment is $47 per ton ($2.35 per hundred). Added to this would be the cost of re-rolling operations, and yet we have known instances where bars have been sold at $2 and $2.25. How is it done?"

Few dealers will commit themselves on the early possibilities as experience has amply demonstrated the fallacy of industrial prediction. "It may mean a long period of dullness," said a dealer, "similar to that of the past six months, while on the other hand, the revival may take place overnight. We know for a certainty that few consumers are heavily stocked and the majority are buying only what they need for immediate use, and succeed in securing the lowest possible price for the least possible quantity." Little buying is being done by the railroads and this is a puzzle to many of the dealers. Owing to the competition among American steel mills, the Pittsburg quotations on some lines have been given a range of from $2.25 to $2.65 on tank plates, and from $2.25 to $2.45 on structural shapes. Local quotations on plates have declined $5 per ton, the price being $5 per hundred on the 3-16 inch size, and $4.50 on the heavier plates. The movement on sheets is light but steady; quotations are easier. Black, 28, are now 6 cents, and blue annealed 5¼ cents per pound. Canada plates, dull, are considerably lower at $7.50 per hundred. Quotations on all bright have been withdrawn. Premier No. 28 are quoted at 8¼ cents, a decline of ½ cent per pound.

Dealers Depleting Stocks

A feature of the present machine tool and supply business is the wide distribution of small orders, a factor that aggregates a fair volume of business but which likewise adds considerably to the expense necessary in securing it. The conservative buying policy of many manufacturing plants has necessitated increased

calls on the part of dealers and salesmen, and very often the small margin of profit is wiped out by the resultant overhead and selling costs. If any one line might be termed active the statement would probably apply to construction machinery, as dealers in contractors' supplies are reporting a fair business. The conservatism of the average consumer is ably seconded by many dealers in their method of clearing out surplus stocks and acquiring only those lines that have a quick sale. The market today does not require that orders for tools or supplies must be on the books far in advance, so that the dealers can relay the customer's requirements on to the manufacturer and obtain prompt delivery.

Sharp Declines in Scrap

While there is no pronounced change in the old material situation, the market is featured by another general decline in price quotations. The consumers are not falling over themselves in placing orders, even when a sharp reduction is announced. Prices are only taken into consideration when an actual covering is required, and the sale is transacted on its individual merits, the purchaser usually getting the best of the argument. The volume of business is exceedingly light, with few large sales recorded. Dealers would be willing to adopt any reasonable method of infusing their customers with a spirit of buying, but price cutting does not appear to serve the purpose. Price reductions this week range from $1 to $8 per ton, the heaviest decline being registered against malleable scrap, which has fallen to $12 per ton. Heavy melting steel is now quoted at $9, a decline of $3 on the previous price. Stove plate at $20 is $3 off, and cast borings have declined from $5 to $3 per ton. Other lines show a proportionate reduction. Non-ferrous lines are likewise weaker but business shows no improvement. Coppers and brasses are down, light copper being quoted at the low figure of 6 cents per pound. Heavy lead has again weakened, the present price being 3½ cents per pound.

GOOD BUSINESS IN CERTAIN LINES

Toronto Dealers and Warehouse Interests Have Varied Experience in Week's Trading

TORONTO.—There are lines of business where improvements have been noticed, and there are others where the claim is made that one week is very much the same as another in the present market.

The machine tool trade is still quiet as regards actual placing of business, and it is still a fact that the majority of the trade is going to firms that handle both new and used equipment. Some dealers are carrying very little new stock now — some of them almost none at all—while the used equipment is in stock and can be inspected at any time. One or two dealers have prospects away to points in the United States for the purpose of inspecting machine tools there that cannot be seen in Canada because there are none operating here. When prospects get interested enough to go out inspecting machines at that distance, sales are not far off.

Several dealers reported that inquiries are improving, and judging from the list of proposals they have out, they should have some business on their books before long if they land only a small portion of their prospects. There is a certain element of uncertainty in the market on the matter of prices, and several dealers stated this week that they were not satisfied that they had reached the bottom of the market, and also that many of their customers seemed to entertain the same views.

Reports Good Month

The manager of one of the Toronto houses reported that they had done a good business in the last month. "Of course," he added, "when we say that we do not mean that it is good compared with some of the months during the last few years, but when present conditions are considered the month's business was good."

This same firm also brought out the point that there was something else to do besides chasing orders, and that was the watching of credits. Some firms that were considered very good a year or so ago are pretty well tied up for working capital now, and banks are not at all anxious to deal in their paper, so it is a fact that a certain amount of business has not come into the machine tool field for that reason.

The sale of small tools is going on in a small way. Actual wants are being supplied, but that is about all that is being done, and several firms that have restarted operations after a shutdown of several months are not buying because they were well stocked at the time of the stopping of operations.

The policy seems to be followed out in many lines, and although it does not bring much grist to the mill for the present, it is certainly clearing the shelves bare for business that must come in when operations become more marked.

Steel Prices Stiffen?

The weight of evidence in the steel market this week seems to show that prices have not sagged any more, but in certain directions they have become stronger. It is known that one large importer—a manufacturer in this case—who takes quite a tonnage of sheets, was informed by several of the mills that a low figure on black sheets was being withdrawn at once. He had been buying around 4c base Pittsburgh district, and even at that figure had not bought very heavily. Another representative of several independent sheet mills has also informed his trade here that prices on which he is now working are likely to be withdrawn without notice. The trade here is wondering what it all means. Some of the warehouse interests seem inclined to think it is a move to hurry up any business that may be undecided as to disposition, while others incline to the belief that cost sheets may show that sheets cannot be turned out at the figure at which they are being offered to-day. Still another Toronto buyer had word during the week from a mill in the Ohio valley that sheets were selling below actual cost of production, and the price was being withdrawn. There is still a fair sale for sheets in this district. In fact it is one of the lines that has remained fairly good right along.

Bars are quiet yet. We are still quoting 4.25 as the average price but better figures are being made on certain deals. The tonnage may be desirable enough to warrant a closer price, or the warehouse may be overstocked and anxious to move material. In such cases a price better than 4.25 can be secured.

Tubes are quieter than they have been for some time. The trade, judging from

POINTS IN WEEK'S MARKETING NOTES

A report received from Glasgow states that very low prices are being offered for scrap iron and steel, the values all being below those prevalent before the war.

The Republic Iron and Steel Co. announce an advance of $2 per ton in bars, shapes, and plates.

Pittsburgh refers this week to "the market dragging along much as in the last few weeks." The feeling seems to be that when the Corporation announces the new schedule it will show substantial reductions.

Canadian buyers of black sheets have been advised of the withdrawal of prices quoted to them by several of the independent mills.

A report from London states that under existing rates of exchange German goods can be sold at a price less than the cost of materials in the United Kingdom.

Machine tool dealers in this district have a large number of inquiries in their offices just now, but actual orders are still slow. One Canadian manufacturer of machine tools says that at the present time they have tenders out on $750,000 worth of equipment.

former years, should look for a pretty fair trade in this line at present, but so far it has not developed, and just now the average is not as good as during the first two months of the year.

Buying in Small Lots

"We are selling in smaller lots to-day than we have for years." That remark is heard in several lines. It is known that there are orders going through and being filled for very small quantities of sheets and bars and tubes, while the same thing is true of small tools. One steel merchant claimed, "We are sending out any number of bills for three and four dollars, a thing unheard of before. It is also more expensive to ship in this way, especially where we have to make deliveries in the city." Another dealer, this time in small tools, gives his experiences as follows: "During the last month we shipped out twice as many orders as during February, but when it was all totalled up we found out that our increase in actual business had been only 15 per cent."

THE STEEL MARKET IS RAGGED AND STABILITY IS NEEDED MORE THAN EVER

Special to CANADIAN MACHINERY.

PITTSBURGH, April 14.—An interesting incident is the announcement of the Republic Iron & Steel Co. of an advance of $2 a ton in its prices for bars, shapes and plates, the advanced prices being 2.10c for bars and 2.20c for shapes and plates. The company made no change in its prices on tubular goods or sheets. It is inferred in the trade that the Republic Company took this action as an experiment, in hope that other independents would do likewise, and that the Steel Corporation would reduce its prices to this basis. The balance of probability is that the other independents will not follow. The theory is a good one, for it is certain the Steel Corporation will reduce its prices at some time, and when it does it will, of course, go at least as far as the lowest prices made by independents. While Republic's regular prices were 2c on bars and 2.10c on shapes and plates there have been some sales at several dollars a ton less, when a fair sized tonnage was involved, with attractive specifications. Republic's advance does not cost anything, since very little business was being booked at the old prices, and a reduction can be made at any time, or competitive prices can be met without any formal reduction being made.

On the same day that the Republic Company announced the advance in its prices on bars, shapes and plates, the Steel & Tube Co. of America, formerly the Mark Manufacturing Co., announced an entirely new schedule of prices on tubular goods, at $10 a ton below the Industrial Board or Steel Corporation prices. The action was entirely unexpected and has caused considerable comment. In line pipe a reduction of $10 from the nominal prices means nothing since line pipe sold weeks ago at a greater concession, and the reduction does not mean a great deal as to oil country goods generally, but in standard steel pipe it is very important, for the shading in this line has been only $2 to $4 a ton. The company's basing discount on standard steel pipe is now 62½ per cent., against the regular published discount of 57½ per cent. shown in the discount lists of other mills. What action the other makers will take remains to be seen, nothing having been done thus far. The market as a whole cannot be quoted at the reduced price of this one interest, not because one good-sized producer could not supply all the current inquiry, but because it is a Western concern and while quoting on the basis of Pittsburgh plus freight to destination it would not sell in the East since then it would have to absorb freight.

Steel prices in general show no change, the market dragging along in this respect much as in the past few weeks. On most products the independents have made a sort of market, though by no means a clearly defined one, at prices ranging from $7 a ton on bars to $18 on galvanized sheets below the Industrial Board or Steel Corporation prices. The Steel Corporation has taken no action. The trade is still speculating as to when the Corporation will make a move as to prices and wages. There is no buying pressure, however, and no evidence that if the Corporation should reduce its prices a buying movement would start. There is no question, however, but that eventually the Corporation must reduce, for otherwise buyers will have no confidence in the market and would not buy if they were otherwise disposed to do so. When the Corporation does reduce prices the reduction will probably be quite extensive.

In some quarters it is being remarked that the Corporation ought to reduce prices, so as to start a buying movement, and it is remarked that in the past a buying movement generally followed sharp reductions in steel prices. Buying could not thus be forced, however. These observers confuse cause and effect. In the past, when the steel producers reduced prices they did not do so arbitrarily, but waited until they could see that there was latent demand, so that the demand, though latent, was really the cause of the reduction. Just now there is no such demand. The mills would be keen enough to see the demand if it existed. The average consumer is more interested in seeing prices maintained so that he can dispose of his stocks than in seeing prices reduced against purchases still to be made.

Steel Corporation Tonnage

The United States Steel Corporation's unfilled obligations amounted to 6,284,765 tons at the end of March, showing a decrease during March of 649,102 tons, an amount equal to 46 per cent. of capacity for the month. Shipments were at about 51 per cent. and the difference between these, only 5 per cent., represents the net bookings, or the total bookings minus any cancellations that may have occurred. It is improbable there were any cancellations of importance, so that evidently the Corporation booked scarcely any new business in March. References are frequently made to the rate at which the Steel Corporation is receiving business, but that is another matter, the reference being to shipping orders, in many cases merely "releases" against orders previously suspended, and thus not new business in the sense of being reportable as additional unfilled obligations. The Corporation's operations now are on old business and on specifications now being received against old contracts, chiefly the former.

Steel Production

Production of steel ingots by the Steel Corporation in March is understood to have been at about 51 per cent. of capacity. From this, and the report compiled by the American Iron and Steel Institute showing the monthly production of 30 of the steel producing companies, it can be computed that the independents during March produced at 31 per cent. of their capacity, and this, with the Corporation operation, makes an average for the industry as a whole of about 40 per cent. Evidences have been coming out of late that the trade reports have tended to underestimate the rate at which the independent steel companies are operating. It is very difficult to make accurate estimates because plants and departments are starting and stopping all the time. Perhaps the personal element enters, by each independent objecting to its full production being known, for fear its competitors would think it is cutting prices more than is the case. It should be noted that the monthly ingot report is not a precise guide to the total production because some steel interests do not report, and they may be operating at much higher or lower rates than are those that do report.

The West Leechburg Steel Co. has formally announced a price of 2.75c on hot rolled strip steel. The market has been difficult to quote of late, there being so few sales to define prices. Cold rolled strip can be done at about 5.70c, the nominal price being 6c.

NEW YORK TOOL TRADE VERY QUIET

No Improvement Noticed and Prospects Not Being Turned Into Business

Special to CANADIAN MACHINERY.

NEW YORK, April 14.—Despite a promising number of "live" prospects—or at least inquiries that were thought to be "live"—the machine tool markets of the East are quieter than at any time this year, and that is saying a great deal. Very few orders are being placed, and such as there are come mostly from small manufacturers and are for single tools. The larger users of machine tool equipment are doing virtually nothing.

In some departments of industry there are signs of an improvement, particularly in the automobile, textile and shoe trades, but this betterment has not yet created any better demand for machine tools. In fact, most of the automobile companies apparently have about all of the equipment they will need for this year's production, and in some instances have more than they will need. Either they will become sellers of some of their surplus equipment or they will manufacture in their own plants automobile parts which heretofore have been supplied to them by other companies.

No doubt the present unsettlement in all metal working lines is due in considerable measure to the fact that the Steel Corporation has not yet announced its price policy. The fact that buyers are expecting a sharp reduction by the Steel Corporation has unsettled the steel market and it naturally follows that products made from iron and steel feel the same unsettlement.

Moreover, there can be no very active machine tool buying movement until general business has revived sufficiently to require the work that machine tools do. Yet if the inquiries which have come to the attention of machine tool builders and their representatives since the first of the year were all to be closed within, say, the next thirty days, there would be a fairly good volume of business.

MUST WATCH THE CREDITS CLOSELY

Some Firms Having Trouble with Collections That Used to Come as a Matter of Course

"It is not simply a matter of selling now, but also watching the changing credits of various firms." According to the head of one Toronto firm of machine tool dealers this is the dual occupation of many of the fraternity just now. "I know of several cases where a very nice order can be secured at any time, but the trouble is with the financing of the deal. The buyer wants more in the way of terms than we are prepared to offer, nor does there seem to be much hope of getting assistance from the bank."

"There is also a wide variance in the collections. Some firms are paying just as promptly as they ever did, while in other cases they are looking for all sorts of excuses, and finding them, too. One of the oddest things we have come across happened when a firm refused to pay a bill long overdue; they claimed a machine previously put in would not do a certain operation. We looked through all the correspondence and found that this operation had never been mentioned. That machine had been paid for long ago and had nothing to do with the order under consideration. However, I made an offer of allowing a certain amount on the machine already in, and they promised to have a cheque down here by a certain day and hour. Well, we never got it What can you do in a case like that? We want to make conditions just as easy as possible, and yet we want our money. The firm a year ago was in splendid shape, and all right yet. We don't want to force matters, so there it rests. And in the meantime we have not got our money."

URGES DEALERS NOT TO ALLOW STOCKS TO GET DOWN TOO LOW

One of the twist drill firms, in a little book recently issued, urges dealers not to allow stocks to run too low. It says in part:

Under the present trying business conditions, it is perhaps human nature to reduce stock inventories. But this retrenchment may be carried too far. We see examples of it every day.

In every line of business there are certain staple lines which are called for at all times. And these articles must be kept in stock or the business of the dealer must suffer.

This is especially true in the tool business.

There are certain lists and sizes that are in constant demand even when business is dull. If a dealer does not maintain adequate stocks, his trade is bound to fall off.

Look at it from the other fellow's point of view.

Perhaps he sends a messenger to you for a few common sizes of drills or reamers. The order is not large but the consumer must have these few tools immediately. You say, "I'm sorry but we are just out of this or that and I cannot fill your order right away. Just wait a little while though, and I'll send out and get it."

As a result the consumer's messenger must wait until you have sent out and gathered up the order. This waste of time in dollars and cents may be more than the actual value of the few drills.

Or to make the case even worse, the consumer may send his truck and driver to pick up this small order. Figure out for yourself the cost of keeping a big truck and its driver waiting for an hour or two while you go and obtain the few simple tools desired.

And what is the usual result?

As a rule the messenger or truck driver cannot wait. His time is valuable and although you may be able to supply some of the tools, he will not split the order. He goes to a dealer that can fill the order complete. This may be one of your greatest competitors who has shown foresight enough to keep a fair supply of the commonly called for tools on hand. As a result you lose the sale of the tools you had on hand and, what is more, the consumer having found out where he can get his orders filled goes there the next time he wants prompt service and he figures that your profit is legitimate only when you give him what he wants when he wants it.

TOOK BACK THE LOW SHEET PRICE

Hamilton Manufacturer Believes That Low Price in Black Sheets Has About Been Touched

Hamilton.—That the bottom of the black sheet market is here, or not far distant, is the opinion of A. T. Enlow, president and general manager of the Dominion Sheet Metal Corporation.

Mr. Enlow had offers from several independent mills, quoting an attractive price on black sheets, of which he buys large quantities for putting through his galvanizing plant. A few days ago he received advice that the price was to be withdrawn, or that it had been withdrawn by some of the mills.

Fortunately, Mr. Enlow was able to cover his requirements when buying was at its best from his point of view.

Some of the prices that were being quoted on black sheets in the last few weeks undoubtedly represented figures that were below the actual cost of production.

Make Screw Cutting Tools.—Galt has a new industry in Hi-Speed Tools, Ltd., organized to manufacture screw cutting tools, taps, dies, gauges, standard and special punching, stamping and forming dies. They plan to be in full operation by May 1. The directors are: W. W. Champ, Regina, Sask., president; L. W. O'Connor, Galt, secretary and manager, and J. A. Johnston, Galt., vice-president. Harry Champ is factory manager. The company starts with a staff that has had much experience in this department of tool production. Machinery is now being installed in their temporary factory in a wing of the Perfect Machine building.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$26 00
Lake Superior, charcoal, Chicago	40 50
Standard low phos., Philadelphia	41 50
Bessemer, Pittsburgh	28 96
Basic, Valley furnace	26 00
Toronto price:—	
Silicon, 2.25% to 2.75%	39 25

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Iron bars, base, Montreal	4 25
Steel bars, base, Montreal	4 25
Reinforcing bars, base	4 25
Steel hoops	5 50
Tire steel	5 00
Spring steel	8 00
Band steel, No. 10 gauge and 3-16 in. base	4 75
Chequered floor plate 3-16 and heavier	6 50
Bessemer rails, heavy, at mill	2 35
Steel bars, Pittsburgh	2 10-2 25
Tank plates, Pittsburgh	2 25-2 65
Structural shapes, Pittsburgh	2 25-2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 48
Structural shapes	3 58
Plates	3 78
Small shapes under 3-in.	3 48

FREIGHT RATES

Per 100 Pounds.

Pittsburgh to Following Points

	C L	L C L
Montreal	58½	73
St. John, N.B.	84½	106½
Halifax	86	108
Toronto	38	54
Guelph	38	54
London	38	54
Windsor	35	50½

Current surcharge, 8 per cent.

METALS

	Gross. Montreal	Toronto
Lake copper	$18 00	$17 50
Electric copper	17 50	17 50
Castings, copper	17 25	18 00
Tin	36 00	39 00
Spelter	7 75	7 50
Lead	6 50	7 50
Antimony	8 00	8 25
Aluminum	34 50	30 00

Prices per 100 lbs.

PLATES

Plates, 3-16 in.	$5 00	$4 75
Plates, ¼ up	4 50	4 25

PIPE—WROUGHT

Standard Buttweld Pipe S/C

Per 100 feet.

Size	Steel Blk.	Steel Galv.	Gen. Wrot Iron Blk.	Gen. Wrot Iron Galv.
⅛ in.	$ 6 50	$ 8 50	$	$ ....
¼ in.	4 89	6 99	5 91	8 01
⅜ in.	4 89	6 99	5 91	8 01
½ in.	6 50	8 03	7 95	9 48
¾ in.	7 99	10 06	9 95	12 02
1 in.	11 82	14 88	14 71	17 77
1¼ in.	15 99	20 13	19 90	24 04
1½ in.	19 11	24 06	23 79	28 74
2 in.	25 72	32 38	32 01	38 67
2½ in.	40 66	51 19	.....	.....
3 in.	53 17	66 94	.....	.....
3½ in.	67 62	84 18	.....	.....
4 in.	80 12	99 74	.....	.....

Standard Lapweld Pipe S/C

Per 100 feet.

Size	Steel Blk.	Steel Galv.	Gen. Wrot Iron Blk.	Gen. Wrot Iron Galv.
2 in.	$29 42	$36 08	$35 71	$42 37
2½ in.	44 17	54 70	54 11	64 64
3 in.	57 76	71 53	70 76	84 53
3½ in.	69 46	86 02	85 10	101 66
4 in.	82 30	101 92	100 83	120 45
4½ in.	95 89	1 20	1 30	1 54
5 in.	1 12	1 40	1 52	1 80
6 in.	1 45	1 81	1 97	2 33
7 in.	1 89	2 37	2 53	3 01
8L in.	1 99	2 49	2 66	3 16
8 in.	2 29	2 87	3 07	3 64
9 in.	2 74	3 43	3 67	4 36
10L in.	2 54	3 18	3 41	4 05
10 in.	3 28	4 10	4 39	5 21

Prices—Ontario, Quebec and Maritime Provinces

WROUGHT NIPPLES

4-in. and under, 50 per cent.
4½-in. and larger, 40 per cent.
4-in. and under, running thread, 20%.
Standard couplings, 4-in. and under, 20%
Dd., 4½-in. and larger, net.

OLD MATERIAL

Dealers' Average Buying Prices

Per 100 Pounds.

	Montreal	Toronto
Copper, light	$ 6 00	$ 9 00
Copper, crucible	11 00	11 00
Copper, heavy	10 00	11 00
Copper wire	10 00	11 00
No. 1 machine composition	8 50	9 75
New brass cuttings	6 00	8 00
Red brass turnings	7 50	8 00
Yellow brass turnings	5 00	6 00
Light brass	3 50	5 00
Medium brass	4 00	6 00
Scrap zinc	4 00	4 00
Heavy lead	3 50	4 00
Tea lead	2 00	2 00
Aluminum	12 00	10 00

	Per Ton	Gross
Boiler plate	$10 00	$12 00
Heavy melting steel	9 00	14 00
Axles (wrought iron)	22 00	20 00
Rails (scrap)	12 00	14 00
Malleable scrap	12 00	20 00
No. 1 machine cast iron	28 00	25 00
Pipe, wrought	8 50	8 00
Car wheel	28 00	25 00
Steel axles	18 00	18 00
Mach. shop turnings	5 00	6 00
Stove plate	20 00	20 00
Cast boring	3 00	7 00

BOLTS, NUTS AND SCREWS

	Per Cent
Carriage bolts, 7-16 and up	Net list
Carriage bolts, ⅜" and less	15
Coach and lag screws	—20
Stove bolts	55
Wrought washers	—25
Elevator bolts	Net
Machine bolts, 7-16 and over	—5
Machine bolts, ⅜-in. and less	—30
Blank bolts	Net
Bolt ends	—5
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	+25
Machine screws, fl. and rd. hd., brass	Net
Machine screws, o. and fil. hd., brass	Net
Nuts, square, blank	+25 add $2 00
Nuts, square, tapped	add 2 25
Nuts, hex., blank	add 2 25
Nuts, hex., tapped	add 2 75
Copper rivets and burrs, list less	27½
Burrs only, list plus	10
Iron rivets and burrs	37½ and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	67½
Wood screws, flat, bright	67½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

	Per Cent
Set screws	Less 40%
Square and hexagon head cap screws	Less 30%
Round head cap screws	Plus 10%
Fillister head cap screws	Less 10%
Flat head cap screws	Net list
Button head cap screws	Plus 10%
Studs	Less 20%
Semi-finished nuts up to and including 1-in.	Less 35%
Semi-finished nuts 1⅛ to 1½"	Less 30%
Semi-finished nuts 1⅝ to 2 in.	Net list
Coupling bolts	Plus 10%
Taper pins	Less 40%
Planer bolts without fillet	Plus 40%
Planer bolts with fillet	Pus 50%
Patch bolts	Plus 80%
Hollow set screws	Plus 20%
Thumb screws	Less 35%
Thumb nuts	Less 65%

BILLETS

F.O.B. Pittsburgh.

	Per gross ton
Bessemer billets	$43 50
Open-hearth billets	43 50
O.H. sheet bars	47 00
Forging billets	48 50
Wire rods	57 00

NAILS AND SPIKES

Wire nails, base	$5 10
Cut nails, base	5 75
Miscellaneous wire nails	50%

ROPE AND PACKING

Plumbers' oakum, per lb.	0 10¼
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 26
British Manila rope	0 20
New Zealand hemp	0 20

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	Net

MISCELLANEOUS

Solder, strictly	$ 0 25
Solder, guaranteed	0 27
Soldering coppers, lb.	0 62½
White lead, pure, cwt.	17 00
Red dry lead, 100-lb. kegs, per cwt.	13 00
Linseed oil, boiled, single bbls.	1 03
Wood alcohol, per gal.	2 75
Whiting, plain, per 100 lbs.	3 00

CARBON DRILLS AND REAMERS

S.S. drills, wire size	40 and 5
Can. carbon cutters, plus	10
Standard drills, all sizes	40 and 5
3-fluted drills, plus	10
Jobbers' and letter sizes	40 and 5
Bit stock	50
Ratchet drills	10
Pure turp., single bbls., gal.	1 20
Linseed oil, raw, single bbls.	1 00
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	25 off
Drills and countersinks	Net
Bridge reamers, carbon	50
Centre reamers	5
Gasoline, per gal., bulk	0 42
Chucking reamers	Net
Hand reamers	10
High speed drills, list net to plus	20
Can. high speed cutters, net to plus	10
American	plus 40

COLD ROLLED STEEL

[At Warehouse]

Rounds and squares	$7.00 base
Hexagons and flats	7.00 base

IRON PIPE FITTINGS

	Black	Galv.
Class A	60	75
Class B	26	36
Class C	17	26

Cast iron fittings, 5%; malleable bushings, 22½%; cast bushings, 22½%; unions, 37½%; plugs, 20% off list.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 00	$ 6 50
Sheets, blue ann., No. 10	5 25	5 50
Canada plates, dull, 52 sheets	7 50	13 00
Can. plates, all bright	14 00	.....
Apollo brand, 10¾ oz., galvanized	.....	.....
Queen's Head, 28 B.W.G.	10 75	.....
Fleur-de-Lis, 28 B.W.G.	10 00	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28, U.S.	8 25	8 50
Premier, 10¾-oz.	8 25	8 90
Zinc sheets	13 00	15 00

PROOF COIL CHAIN

Warehouse Price)

B

¼ in., $13; 5-16, $11; ⅜ in., $10; 7-16 in., $9.80; ½ in., $9.75; ⅝ in., $9.20; ¾ in., $9.30; ⅞ in., $9.50; 1 in., $9.10; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain. $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $16.75; 3-16 in., $15.40; ¼ in., $13; 5-16 in., $11; ⅜ in., $10; 7-16 in., $9.80; ½ in., $9.75; ⅝ in., $9.50; ¾ in., $9.30.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClennand, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES

Size	Seamless	Lapweld
1 in.	$26 00	$.....
1¼ in.	27 25	.....
1½ in.	26 25	29 50
1¾ in.	29 75	27 00
2 in.	29 25	24 50
2¼ in.	33 00	28 50
2½ in.	44 75	32 50
3 in.	49 25	40 00
3¼ in.	.....	48 50
3½ in.	63 50	43 50
4 in.	85 00	55 50

Prices per 100 ft., Montreal and Toronto

OILS AND COMPOUNDS

Castor oil, per lb.	—
Royalite, per gal., bulk	28
Palacine	31
Machine oil, per gal.	58
Black oil, per gal.	27
Cylinder oil, Capital	1.01
Petroleum fuel oil, bbls., net	11.2

BELTING—No. 1 OAK TANNED

Extra heavy, single and double	15%
Standard	15 and 10%
Cut leather lacing, No. 1	2 00
Leather in side	2 40 3 00

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	$4 50
Polishing wheels, bull-neck	2 00
Emery in kegs, Turkish	8¾
Pumice, ground	06
Emery glue	30
Tripoli composition	9½
Crocus composition	12
Emery composition	11
Rouge, silver	64
Rouge, powder, nickel	38

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	8½
Grits, 80 and finer	6

BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod	30
Brass sheets, 24 gauge and heavier, base	38
Brass tubing, seamless	42
Copper tubing, seamless	44

XXX Extra	21
Peerless	22
Grand	21½
Superior	21½
X L C R	16½
Atlas	19
X Empire	15
Ideal	18
X Press	13½

WASTE

Colored

Lion	13½
Standard	12
No. 1	14
Popular	10½
Keen	9

Wool Packing

Arrow	35
Axle	28
Anvil	22
Anchor	17

Washed Wipers

Select White	20
Mixed colored	10
Dark colored	09

This list subject to trade discount for quantity.

RUBBER BELTING

Standard	10%
Best grades	15%

ANODES

Nickel	.55 to .60
Copper	.38 to .40
Tin	.70 to .70
Zinc	.16 to .17

Prices per lb.

COPPER PRODUCTS

	Montreal	Toronto
Bars, ½ to 2 in.	$30 00	$34 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	32 00	38 00
Copper sheet, tinned, 14 x 60, 14 oz.	38 00	42 00
Copper sheet, planished, 16 oz. base	44 00	48 00
Braziers', in sheets, 6 x 4 base	36 00	41 00

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$ 9 50	$14 50
Sheets, 3½ lbs. sq. ft.	9 25	14 00
Sheets, 4 to 6 lbs. sq. ft.	9 00	13 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .25
Acid, hydrochloric	.03¾
Acid, nitric	.10¼
Acid, sulphuric	.03¾
Ammonia, aqua	.20
Ammonium, carbonate	.23
Ammonium, chloride	.22
Ammonium, hydrosulphuret	.75
Ammonium sulphate	.30
Arsenic, white	.18
Copper, carbonate, annhy.	.35
Copper, sulphate	.10
Cobalt, sulphate	.20
Iron perchloride	.62
Lead acetate	.30
Nickel ammonium sulphate	16½
Nickel carbonate	.30
Nickel sulphate	.17½
Potassium sulphide (substitute)	.40
Silver Chloride (per oz.)	1.15
Silver nitrate (per oz.)	1.10
Sodium bisulphate	.13
Sodium carbonate crystals	.04
Sodium cyanide, 127-130%	.39
Sodium hyposulphite per 100 lb.	6.50
Sodium phosphate	.15
Tin chloride	.80
Zinc chloride, C.P.	.30
Zinc sulphate	.08

Prices per lb. unless otherwise stated

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES

MUCH DEPENDS ON FARM CROPS

Brantford Manufacturer Has Contract for Turning Out a Small Farm Engine

A. A. Goodwin, president of the Ker & Goodwin Machinery Co., Ltd., of Brantford, when asked for his opinion on the business outlook, informed Canadian Machinery that as far as his business is concerned the prospects for a big increase depend entirely on the crop outcome in the West.

He is a keen student of market conditions and says that all indications point to this year's harvest being the greatest that Canada has ever produced.

Mr. Goodwin says that 33 1-3 per cent. more land will be under cultivation this year over last, and this, together with the snowfalls that are now being experienced in the wheat belt, point to a banner year for Canada's great West. Mr. Goodwin further informed Canadian Machinery that while general machine work is inclined to be slack they have just signed contracts with the Renfrew Machinery Co. and A. R. Williams, of Toronto, for the sale of a large number of the Hvid type, Brantford oil engines that they are manufacturing. These are unique little engines, especially adaptable for farm use, and are constructed along Diesel lines, having no spark plugs, coils, magnetos, batteries, wires, switches or carburetors, and using crude oil or kerosene for fuel.

MANY TENDERS BUT FEW ORDERS

How Some of the Galt Firms Are Doing in These Days of Reconstruction

GALT.—Mr. Goldie, of the Goldie, McCulloch Co. of this city, when interviewed on the subject of market conditions said present business is decidedly slack. His company has $750,000 worth of tenders out at the present time but has small hopes of this resulting in orders until such time as a reduction of wages, coupled with a showing of more energy on the part of the workers, and a steady market would offer more inducement for building operations.

Just when these conditions would come about Mr. Goldie could not say, but felt that the coming summer would bring forth a change for the better. The need of immediate construction work is great and it only remains for a restoration of public confidence through the adjustment of the wage question and the settling of the market to see work commenced on a large scale.

—Orr in the Chicago "Tribune."

DESTROYING THE SEED OF PROGRESS.

A Busy Shop Here

W. D. Sheldon, of Sheldons, Ltd., said his plant has not lost an hour as yet. Orders are continuing to come in and if present conditions hold Mr. Sheldon says that this will be one of the best years of business his firm has ever enjoyed.

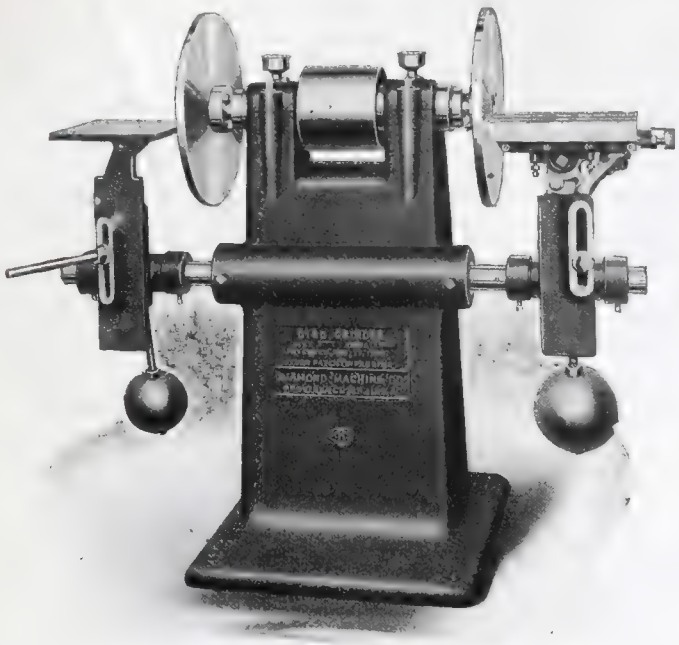
Hinges on Steel Corporation

Mr. Cowan, president of Cowan & Co., manufacturers of woodworking machinery, told this paper he felt that the results of the annual meeting of the United States Steel Corporation at the end of the present month would affect conditions to a great extent. If, as expected, steel prices take a drop, Mr. Cowan thinks that construction work will begin to move, especially so if the worker can be made to realize that he must speed up his productive powers.

His Unlucky Day

April 5 proved to be an unlucky day for John Turnbull, a shareholder and superintendent of the Shirley, Deitrich Co., Ltd., of Galt.

Mr. Turnbull was doing some experimental work on a thin bevel edge emery wheel when the little finger on his left hand got caught in some manner between the wheel and the rest, causing him to lose his finger close to the hand. For a man well on to sixty years of age Mr. Turnbull showed remarkable fortitude. He took the rest of the day off but when the writer called the day after the accident Mr. Turnbull was back on the job, superintending operations with his hand and arm in a sling.



DIAMOND
DISC GRINDERS

Good grinding in fast time has made the Diamond popular in a host of shops. The right design and build eliminate vibration and give the operator a perfect surface every time. There is a suitable size and equipment for every surface grinding job you have. Workmanship and material of "Diamond" quality throughout.

May we send you catalogue?

The A. R. Williams Machinery Company, Limited

ST. JOHN, N.B.
WINNIPEG, VANCOUVER

If It's Machinery, Write "Williams"

64 Front Street West
TORONTO

Pig Iron Market

The March pig iron statistics show the greatest shrinkage in output in all the months of the decline, and the production during the last week has been the smallest on record in proportion to the country's capacity.

An inquiry has been put out on the Pittsburgh market by the Oil Well Supply Co., for 1,000 to 2,000 tons of foundry iron for delivery between now and July 1st, and the American Radiator Company is asking prices on a total of 4,600 tons of foundry iron for early delivery at its several plants. Neither inquiry has been closed and there is some doubt whether all of the iron asked for will be placed in the near future.

The average prices for basic and Bessemer iron from Valley furnaces in March, as compiled by W. P. Snyder & Co., were $24.50 for basic and $26.50 for Bessemer, as compared with $25 and $27 respectively in February.

While buying is still much below normal at Chicago, there are indications of improvement. Some of the foundries serving the automobile industry are again getting busy.

Cincinnati reports the dullest week for the past year, even carload orders being very few.

One iron maker on the Birmingham market reports a large number of small orders, but no large ones, during the past week. He also shipped as much iron as one furnace made. The $25 base seems to have stood pretty well, being shaded only in case of close competition.

The Buffalo market has improved slightly during the last week. One interest has started another blast furnace and another intends to start an open hearth within a few days.

One company reports inquiry for 4,000 tons of pig iron.

Scrap Metal Market

The decline in prices on scrap material is still unchecked. Melters almost without exception in the Pittsburgh district are out of the market, and dealers who have yards appear to have all the funds they care to have tied up employed in the tonnages now lying in their yards.

The market at Chicago received a slight stimulus during the past week as a result of the cleaning up of old contracts for heavy melting and malleable which expired with the end of the month.

The small amount of business transacted at New York in scrap material indicates that prices are still descending.

Cleveland reports practically no change in the scrap market. A local mill has purchased a few small lots of heavy melting steel at $12 to lay down in its yard, and turnings are being purchased by dealers in small lots for yard stocks at $6 and $7.

The scrap market continues to be dull at St. Louis, but dealers are beginning to pick up some scrap to lay down in their yards.

Owing to the prices of all grades of scrap dropping so low at Philadelphia only forced sales are being made.

Want Equipment.—The Crown Furniture Co., Ltd., of Preston, Ont., are building an addition to their plant to accommodate a new machine shop, which will be built to handle the manufacture of filing systems. Roy McMullen, who is mechanical superintendent of the Crown Furniture Co., informed this paper that they would be in the market within the next two months for the following equipment: six turret lathes, an engine lathe, universal grinder, surface grinder, milling machine and some other small accessories.

One million pounds of copper has been imported by the Canada Wire and Cable Works, Leaside, Ont., from the Anaconda Mines, Montana, for the manufacture of wire.

The Vulcan Iron Works, Ltd., Winnipeg, have received the contract for the miscellaneous and ornamental iron work for the Technical School, Calgary. The general contractors are the J. McDiarmid Company.

LET GERMANY WORRY OVER THE PAYING OF THE DEBT TO THE ALLIES

WRITING to Canadian Machinery, John S. Watts, M.E., of New Glasgow, N.S., says:

While I have not been requested to express an opinion upon the advisability or otherwise of trading with the enemy (the German is still in actual fact, although not legally so, our enemy), I am impelled to butt into the discussion because of my studied conviction that such trading will tend to our own undoing in the not far distant future.

The main argument brought forward by those who advocate resuming commercial relations with Germany is that unless we do so Germany will be unable to pay the reparation which is demanded from her. For the sake of argument, let us assume that this is correct. To get our indemnity then, we must purchase sufficient goods from Germany to permit them to repay to us the damages assessed against them, out of the profits on such sales. Taking the average net profit on the transactions at the comparatively high figure of 10 per cent., the Allies will be compelled to purchase goods in Germany to the value of at least ten times the amount of their claim against Germany, which would simply make Germany the workshop of the world and leave the rest of us without employment.

If we trade with Germany, there must perforce be profit in the trade for Germany, and if unrestricted trade is allowed we will soon have Germany again the menace to the peace of the world that she was in the years before 1914. It is impossible in the space of a short letter to prove this statement, but it will not, to any who have really studied the matter, need proof.

To those who are laboring under the delusion that the German will refrain from using any force at his command to steal the wealth of other countries, or that he is now, or ever has been, other than a predatory barbarian, with a penchant for stealing, I would recommend a study of the history of the Prussian people and of the writings of their statesmen.

Such a study will show that the Prussians, as far back as we can trace them in history, have always existed mainly by the plunder forcibly stolen from their weaker neighbors.

That they are a brutal people, cruel to those in their power and servile to those who are stronger.

That they intend to gather their strength again for another effort to conquer, we have their own statements to prove.

That they have shown no symptoms of repentance for the vile outrages and unspeakable abominations committed by them during the war, and will repeat them any time they are powerful enough to do so.

In conclusion I would suggest that we cease to worry over how they are to pay the indemnity, let the Hun do the worrying, and if we keep him under the control of superior force I am sure he will find a way to pay. Anyway, when a criminal is fined, the judge does not have to consider how the criminal is to finance the fine, it is up to the guilty party to find the money, as best he can, or suffer the penalty, and there is no reason why the greatest criminals of all time should be treated more leniently. Let us have at least the intelligence, after having been "once bit, to be twice shy."

SCOTTISH SCRAP MARKET IS POOR

Nearly All the Prices Are Lower Than Those Which Were Quoted Before the War

Writing to Canadian Machinery on conditions of the scrap market in Scotland, James Johnstone & Son, 212A St. Vincent Street, Glasgow, state:

Since last writing you the market for scrap has completely collapsed, owing largely to competition from the Continent. The iron and steel works here have very few orders on hand, and several of the leading works have not melted anything this year, and the others are only working a small proportion of their furnaces. Consequently the only buyers of scrap are some merchants who are inclined to buy in the hope that prices will advance later on. Present prices are as follows:

	Per ton		
Heavy mild steel melting scrap	£3	0	0
Heavy wrought iron scrap	£4	0	0
Heavy steel turnings	£1	15	0
Cast iron borings	£1	0	0
Heavy machinery metal	£7	0	0
Light metal	£4	10	0

Nearly all of these prices are lower than they were before the war. Very few transactions are now taking place and only for small quantities.

$2,000 IS AVERAGE OF THE SYSTEM

Some Figures Showing Where Wage Bill of the National Railways Has Gone

Speaking before the Canadian Club, D. B. Hanna, chairman of the Canadian National Railways, quoted figures to show the tremendous increase in wages and the cost of materials with which the management had been confronted. At the present rate the average wage of every man, woman and office boy employed by the company would be $2,000 for 1920 contrasted with $709 ten years ago. Yet if the Canadian Railways were allowed to charge the same freight rates as the Government owned lines of South Australia he would undertake to pay 5½ per cent. on all capital invested, 5½ per cent. on the Canadian national debt and have a round hundred millions to the good. He did not suggest such rates, but was there any reason why railways shouldn't be allowed to live? Mr. Hanna's address made a deep impression on his audience and he was frequently applauded.

Trade Gossip

A belt dressing factory is being built by J. W. Bowden, 164 Cottingham Street, Toronto.

* * *

Jarry Bros., 2828 St. Lawrence Blvd., Montreal, are planning to build a garage on Beaubien St.

* * *

Lanagan Bros., Strathroy, Ont., are having plans prepared for the erection of a garage costing $7,000.

* * *

The erection of a warehouse at Cartierville, Que., is contemplated by J. B. Leger, 291 Monkland Blvd., Montreal.

* * *

The erection of freight shed and improvements to station is planned by the Amherstburg Hydro Electrical Railway.

* * *

Plans are being prepared by H. Vallance, architect, 128 Bleury St., for show rooms and general offices for Crane, Ltd., St. Patrick St., Montreal.

* * *

The general contract for the construction of a garage costing $7,000 for the International Harvester Co., 217 York St., London, has been awarded to R. G. Wilson & Sons, 193 College St.

* * *

The Ruggles Motor Truck Co., Dominion Savings Building, East London, Ont., are contemplating the erection of an addition to their factory.

* * *

Mr. McFadden, one of the Ontario representatives of the Diamond State Fibre Co. of Canada, is in the hospital at Port Hope suffering from pleurisy.

* * *

The Hamilton Bridge Works Co., Ltd., have received the general contract for the construction of superstructure of steel bascule bridge for Dominion Government at Burlington, Ont.

* * *

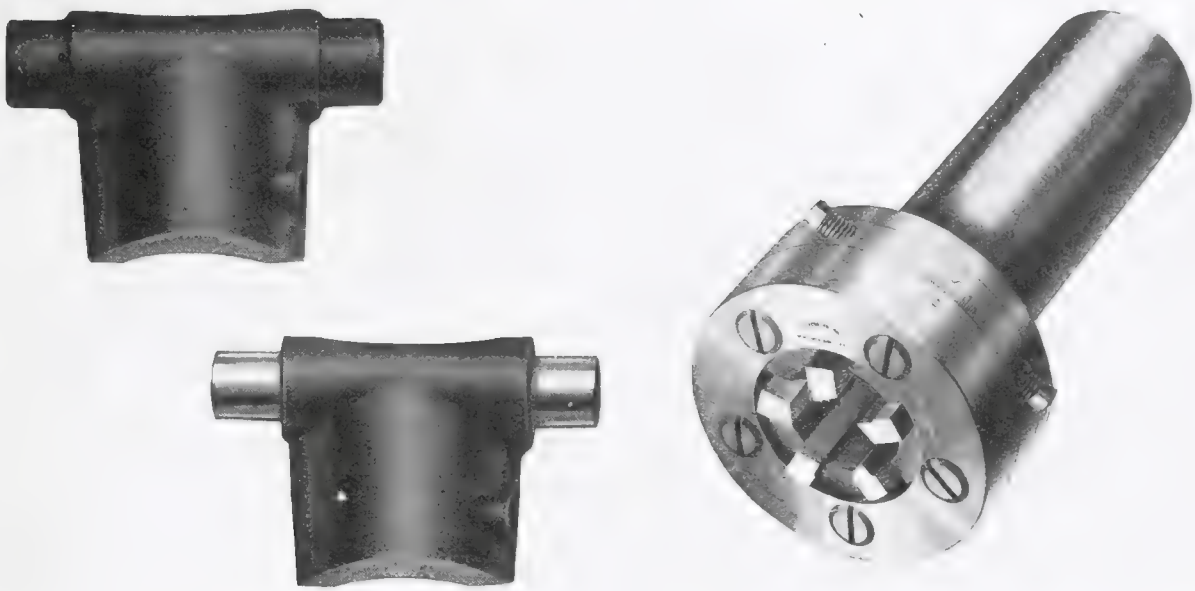
C. W. Northcott, manager of the Regina branch of the Goold, Shapley and Muir Co., Ltd., Brantford, has been promoted to the position of general sales manager at Brantford. He will have supervision over all sales, both east and west, and jurisdiction over Western Canada.

GEO MET RIC

Right on the Lead

2,000 A DAY

1/16" TURNED DOWN ON 2,000 DROP FORGINGS WITH A GEOMETRIC ADJUSTABLE HOLLOW MILLING TOOL



There is an extensive quantity of milling that is done with great economy by the use of GEOMETRIC ADJUSTABLE HOLLOW MILLING TOOLS.

Like all other Geometric Tools, the Hollow Mill is regarded as superior at home and abroad. A Sydney (New South Wales) man volunteers the good information that he has used different styles of GEOMETRIC DIE HEADS and GEOMETRIC HOLLOW MILLS quite a lot, and after cutting threads under all sorts of conditions with all sorts of methods on his side of the world and in England, he has arrived at the conclusion that the GEOMETRIC WAY CANNOT BE EQUALLED.

The Geometric Hollow Mills provide an efficient and economical method of reducing duplicate parts to an exact diameter prior to threading and for brass finishing.

Send for the Geometric Adjustable Hollow Milling Tool Booklet if you are interested, for it tells what these tools are doing.

THE GEOMETRIC TOOL COMPANY
NEW HAVEN CONNECTICUT

Canadian Agents :

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto; St. John, N.B.; Halifax, N.S.

If interested tear out this page and place with letters to be answered.

The National Acme Plant's Bonus System

Several Objects In View, Among Them Being the Securing of Regular Attendance—All Must Co-operate in Order to Secure Conditions That Make the Payment of the Bonus Possible

THE payment of premiums to industrial workers for maintaining or exceeding a predetermined quantity production on a certain article is now recognized as one of the best methods of obtaining the full co-operation of the employees in solving the problem of manufacture. The varied character of the pieces produced, together with the different classes of machines and equipment necessary for production, makes it almost impossible to duplicate premium payment plans in other shops, but the principle involved is generally such that slight modifications of the details may be made so that a satisfactory working plan can be devised to conform to any or all conditions.

Early in January of this year the National Acme Co. inaugurated a premium payment plan, at their Montreal plant, that has been favorably received by the workmen, and its operation, so far, has been very successful and entirely satisfactory both to the employees and to the company. The scheme is being tried out first in connection with automatic and nut machine operators and helpers. Provision is also made to include those employees indirectly associated with the successful operation of the premium system. This is a very important factor in securing maximum efficiency from any proposed plan of this character, as the co-operation of everyone in the plant is required to maintain the spirit of harmony essential to the success of an undertaking of this kind.

Based on Month's Work

Linemen, machine repair men and assistant foremen, who are more or less responsible for the production obtained, are rewarded on the standard of efficiency shown for the month by the department in which they are employed. These awards are made once a month and the amount of the premium is reckoned on a basis of from 10 to 15 per cent. of their month's salary, provided there has been no wilful absence from their regular duties during that period.

Regarding the actual machine operations, the operator and his helper are expected to supervise the running of four machines, and the premium system in force is of a graded character, being increased as the estimated output is obtained on two or more machines. If scheduled production is maintained on the four machines, it is possible for the operator to obtain $1.65 and the helper $1.10 over their regular day rate. Helpers are required to qualify to the satisfaction of the department foreman before they are entitled to participate in the premium payments.

Premiums are not allowed to either operator or helper for any part of the full day less than 9½ hours, for a working day of 10 hours, or for less than 4½ hours on a Saturday half-day, even though the estimated production has been obtained, as one of the primary objects was to insure regular attendance at their work for the entire day. However, provision is made for the absence of one or the other; that is, should the operator be away for a greater period than one-half hour and the helper succeeds in getting the required output, the helper will receive his allotted premium, and vice versa.

If, for any reason, it is deemed necessary to reduce the working hours for the day, the premium schedule will be revised to conform to the changed conditions. On work that requires less than a two-day run premiums are not allowed, but work of this kind is distributed as evenly as possible amongst the different operators.

Where any premium plan is in operation there is the possibility, particularly where the class of work is of a varied character, of making errors in the original estimated production. If the production is underestimated the output is revised and the premium allowed on the new estimate. Should the initial estimate exceed the possibility of paying a premium, the company consider they have assumed a loss and no payment is allowed. Where alterations are made in the method of production, such as improved machines or re-tooling, revision of production rate is made and the premium based on the new estimate.

Operators are encouraged to suggest changes that will increase production but are not permitted to adopt their own ideas without the consent and approval of the department heads. Premiums are allowed only on work accepted by inspectors. If quantity or quality is in question, the matter is investigated by the production clerk, and his decision is final.

The success or failure of this plan is decidedly up to those interested, and the scheme may be discontinued at any time, when, in the opinion of the management, production does not warrant its continuance.

TURNING TAPERS BY SETTING OVER THE TAIL STOCK

Tapers are usually given in "inches per foot" and include the total taper or difference in diameters unless otherwise noted. In turning tapers in the lathe it is necessary to consider the total length of the bar, whether the taper extends the whole distance or not, and to set the tail stock over just as though the taper extended the whole length.

If the taper is ¾ inch per foot as in pipe threads and the whole bar is 16 inches long, then the total taper is 1 inch and the tail stock must be set over ½ inch. There is nothing to remember except to set the tail stock over half the total amount if the whole bar was tapered at the same rate.

MR. FIELD ON THE WAY TO TORONTO

F. W. Field, the British trade commissioner for Ontario, will be returning to Toronto from the United Kingdom, on SS. Olympic, leaving on the 6th of April. Mr. Field left Toronto in the middle of October last year, and during his stay in the United Kingdom he has interviewed over 540 British manufacturers interested in trade with Canada. He has addressed numerous chambers of commerce, rotary clubs, etc., and visited over forty factories and plants. The principal commercial and industrial centres in England, Scotland and Wales were visited and Mr. Field found a widespread interest existing amongst British manufacturers regarding trade conditions and prospects of doing business in the Dominion. It is anticipated that many United Kingdom manufacturers will be visiting Canada this year, with a view to establishing business connections.

During the period of the British Industries Fair Mr. Field was in attendance at the White City and met many buyers from Canada. The attendance at the fair was highly satisfactory, nearly 65,000 visiting the White City. Overseas buyers came from fifty different countries, from Chile and China, from Sweden and Singapore. While the bulk of the foreign buyers came from Europe, Holland, Switzerland, Belgium and Scandinavia being specially well represented, the attendance from the Dominions was also considerable and many American visitors were seen.

Considering the severe and universal nature of the present trade depression, the bookings in most sections of the fair were considered satisfactory. Many firms did exceptionally heavy business, but throughout the fair as a whole business was considerably below that of last year.

ATKINS

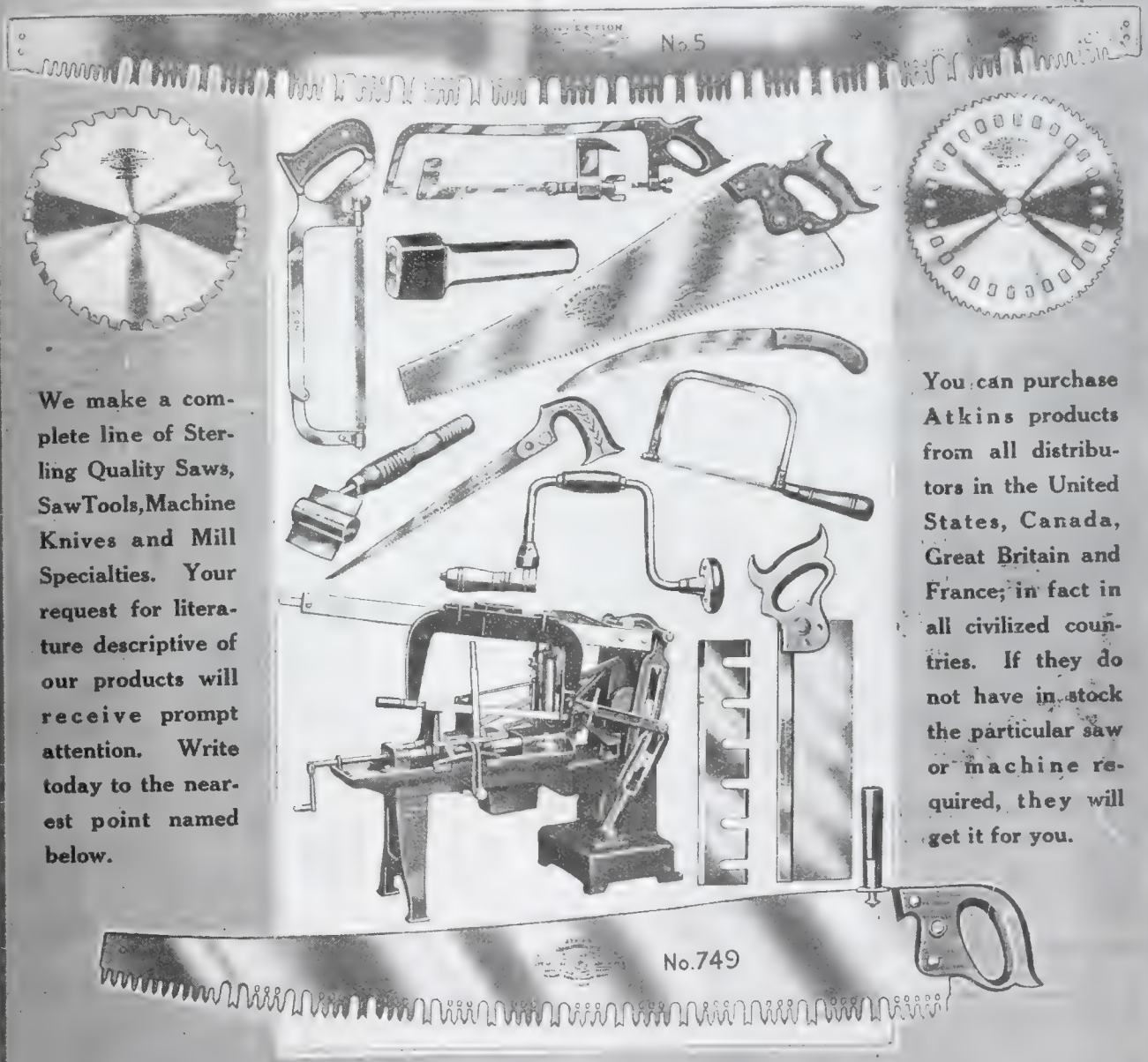
STERLING QUALITY

SAWS and TOOLS

A Perfect Saw for every Purpose

"Finest on Earth"

"Finest on Earth"



We make a complete line of Sterling Quality Saws, SawTools, Machine Knives and Mill Specialties. Your request for literature descriptive of our products will receive prompt attention. Write today to the nearest point named below.

You can purchase Atkins products from all distributors in the United States, Canada, Great Britain and France; in fact in all civilized countries. If they do not have in stock the particular saw or machine required, they will get it for you.

If you have difficulty in obtaining Atkins Saws and other products through your regular service, write

E. C. Atkins & Company

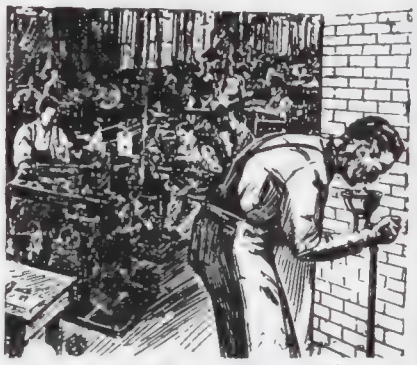
Established 1857

Canadian Factory: HAMILTON, ONTARIO

Branch: VANCOUVER, B. C.

If interested tear out this page and place with letters to be answered.

Upon the Health of your employees depend your profit and production



Don't be contented with half way goodness of makeshift drinking arrangements

Throw out the germ-laden Drinking Cup!

Give your men a clean drink

PURO SANITARY DRINKING FOUNTAIN

(MADE IN CANADA)

Allows us the proper amount of cool, clean fresh water to come through the bubbler No spurting, overflowing, no Loss. Puro regulates itself. Puro" saves 35% on water bills, too. You can attach it in a few minutes. Tell us how many men, how many departments and we'll tell you how much the cost will be.

Puro Sanitary Drinking Fountain Co.

Canadian Agents:

McKENZIE BROS.

888 F. St. Andre St., Montreal, P.Q.

DROP FORGE DIES

Send us your blueprints and specifications. Entrust your requirements to experienced workmen and up-to-date equipment. Have your dies made in Canada. First-class workmanship guaranteed.

THE KIMBER & HILLIER MFG. CO.,
Thorold Road, - St. Catharines, Ont.

HAMILTON ENGINEERING SERVICE
LIMITED

Consulting and Designing — Tools, Jigs, Fixtures and Special Machinery. Let us shoulder your problems.

17 MAIN ST. EAST, HAMILTON

NEW CATALOGUES

Those interested in any of the catalogues described below can procure a copy of the same by writing direct to these firms. Mention that you noticed this in Canadian Machinery.

CRANE PAMPHLET

The Shepard Electric Crane & Hoist Co., Montour Falls, N.Y., have issued a pamphlet dealing with their transfer cranes. Illustrations are shown to prove their effectiveness.

DRILL PAMPHLET

The Aurora Tool Works, Aurora, Ind., have issued a pamphlet dealing with their 28-in. ball bearing upright drill. Full particulars of the construction of this machine is shown, also three photographs of the same. Complete specifications are included.

KELLER PRODUCTS

The Keller Pneumatic Tool Co., Grand Haven, Mich., have issued a pamphlet dealing with their line of riveting hammers, sand rammers and drills. These are well illustrated and data pertaining to the same are given. A list of Keller products is also included.

REAMER DATA

The Gisholt Machine Co., Madison, Wis., have issued a booklet on the subject of reamers at work. This booklet contains examples of work performed and describes in detail this company's manufacturing reamers. It concludes with a list of the various sizes procurable.

FORCING PRESSES

The Lucas Machine Tool Co., Cleveland, Ohio, have issued various pamphlets dealing with their line of power forcing presses. These range from 15 to 50-ton capacity and a full description is given of their construction. Interesting photographs are shown of these various presses.

STOCK LIST

The Lyman Tube & Supply Co., Ltd., Montreal, have a good method of issuing their stock lists. Enclosed in the form of a piece of tube is to be found the various stocks on hand and the very appearance of the booklet attracts one to it, ensuring its receiving the proper attention.

BOOK ON BLOWERS

The B. F. Sturtevant Co., Hyde Park, Boston, Mass., have issued a catalogue No. 276 which describes their Design 5 Turbo-Undergrate Blower. This book discusses first the subject of such a blower, then goes into details regarding its construction, installation, etc. The second part is devoted to the care and operation of such a blower. The third portion of the book takes up the method of ordering replacements or spare parts.

STEEL BOOK

The Vanadium-Alloys Steel Co., Latrobe, Pa., have issued a new booklet dealing with their red cut superior high speed steel. The contents deal with heat treatment, forging, annealing, hardening, double preheating, drawing or tempering, pack hardening, and uses of this particular type of steel. There is also a drill and reamer section, a roll turners' department and other interesting portions to this book, including some tables that will be useful to anyone interested in steel of any kind.

PRESS CATALOGUE

The V. and O. Press Co., Brooklyn, N.Y., have issued a catalogue dealing with their line of presses, dies and special machinery. This includes bench, inclinable, open back, double action crank, double action cam, punching, arch, horning and wiring presses, also presses of the reducing and hand toggle type.

Roll feed and other attachments are illustrated, including dial feed and straightening devices, and dies and special machinery conclude the book.

PNEUMATIC TOOLS

The Globe Pneumatic Engineering Co., Ltd., London, England, have issued a catalogue dealing with their line of pneumatic tools and appliances. This book covers chipping hammers, caulking hammers, riveting hammers, sealing hammers, jam riveters, chisels, snaps, drilling machines, reaming machines, tapping machines, wood boring machines, air compressors, surface grinders, hose couplings and other similar lines. This is a very complete catalogue and covers quite a representative line.

PORTABLE TOOLS

The United States Electrical Tool Co., Cincinnati, Ohio, have issued a catalogue dealing with their line of portable electric tools. Breast or hand drills of various styles are shown, also applications of the same. Portable stands for such drills are described, also a style of portable radial for heavier work. Electric screw drivers, electric grinders, centre grinders, internal grinders, surface grinders, bench grinders, buffers and heavier styles of floor grinders are included in this catalogue.

PORCELAIN ENAMELING FURNACES

The Chicago Flexible Shaft Co., Chicago, Ill., have issued a new catalogue No. 80, which deals in detail with various of their lines. Porcelain enameling methods and furnace construction are discussed, both from the metallurgical and practical shop standpoint. This information in itself is well worth while, and to anyone interested in furnaces the data is well worth preserving.

The remaining portion of the catalogue is devoted to muffle, oven, triple purpose and crucible furnaces, also forges, pressure blowers, pyrometers and various styles of burners. Some valuable tables are also included.

HOW I FIXED IT

This is the title of a very interesting book issued by the Greenfield Tap & Die Corp. The method of gathering the information contained in the book is rather good. For some time past this concern has been anxious to know definitely what jobs farmers were using their tools for, so through the medium of three farm journals, they offered prizes for the best stories of actual jobs performed. The result, of course, is the book, and it speaks well for the company's aggressiveness that the idea has reached such a successful compiling of real information, especially to the class they want to reach. In fact this book should be of interest to everybody in general as it shows unthought of uses for such articles as this company produces.

BOOK ON CAM DESIGN

The D. Van Nostrand Co., 8 Warren St., New York, have published a very interesting book entitled "Cam Design and Manufacture, by F. B. Jacobs." Canadian Machinery has had the pleasure of perusing this book, and a short portion from the preface is well worth repeating. "When cams are laid out by cut-and-dry methods they are noisy in operation, create a vast amount of friction and are short-lived. On the other hand, if the curves are properly laid out, giving all possible time for the rises, the finished

cams can be run at high speeds with very little noise or friction."

This briefly is the secret of successful cam design, and designers in general will no doubt welcome such a book, for complicated formulas have been eliminated in its preparation. The book is divided into seven chapters and is well illustrated throughout, both with photographs of modern machine tool equipment, and with line drawings showing mode of constructing various shaped cams. Following are the titles of the various chapters.

Machine cam design—gas engine cam design—cam followers—master cams—machine work on cams and cam cutters—cam cutting—while the last chapter is devoted to cam grinding.

Taken in all this book should be of real interest to anyone up against a cam problem of any nature, as the principle of any cam design is very clearly given.

New Incorporations

General Forgings and Stampings, Ltd., has been incorporated to manufacture, sell and deal, etc., in automobiles, motor trucks, and vehicles of all kinds, with capital stock of $900,000 and head office at Merritton, Ont.

* * *

The Hercules Truck Company, Ltd., to take over the business formerly carried on by William Kerr and Enan Stanley Kerr, to manufacture, repair, etc., all kinds of trucks, automobiles, etc. Head office to be situated at Hamilton, Canada, and capital stock of $100,000.

* * *

The Happy Thought Foundry Co., Ltd., to carry on the business of manufacturers and dealers in furnaces, general machinery, iron founding, etc., with capital stock of $500,000 and head office at Brantford, Ont.

* * *

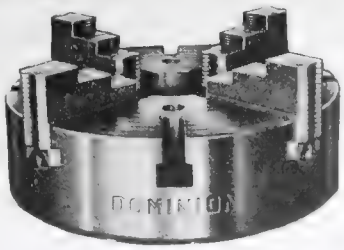
The Canadian Transit Co. with capitalization of $5,000,000 has been incorporated for the purpose of constructing and operating a railway and general traffic bridge across the Detroit River between Windsor and Detroit. The directors are given power to borrow money and issue bonds, etc., subject to and approved by the railway commission of Canada. They may not commence construction of the bridge until an act of the United States Congress has been passed approving the work.

AUTOMATIC WARNINGS.

On one of the chief British railways nearly all the locomotives are fitted with an automatic device to warn the driver when the "home" or "distant" signals are against him. A crank is placed between the two sets of rails, and when the signals are not down it comes into contact with a lever on the engine, sounding the whistle and opening a small cock on the train pipe, thus putting on the brake. This mechanism is expected to raise still higher the standard of safety achieved in British railway operation.

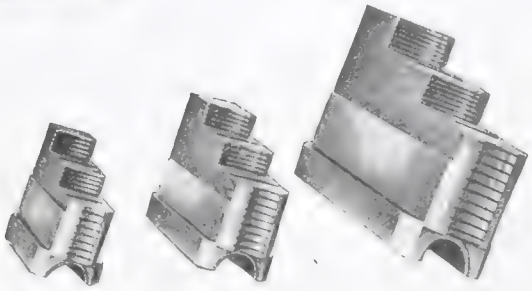
HANDY FIXTURE.

The ordinary "breast drill" is one of the most familiar of hand-operated tools and is commonly employed in workshops where small holes have to be drilled only occasionally. It may often happen, however, that it becomes necessary to drill a number of detached pieces, which could be more easily handled by a light bench drill. At the same time, the volume of such work may not be sufficient to justify the purchase of a bench drill. To meet these conditions, a British firm of engineers has introduced a small fixture which enables the ordinary breast drill to be adapted as a bench drill. It consists of a pillar, which can be bolted to the fitter's bench, carrying two arms, one of which takes the thrust at the end of the spindle, the other virtually taking the place of the operator's left hand. The feeding of the drill is operated by a treadle so that the operator's hands are free to manipulate the work and turn the drill. The whole equipment is very simple and cheap.



DOMINION CHUCKS

STEEL OR CAST-IRON BODY
BUILT FOR HEAVY DUTY



The Jaws Are Extra Strong

THEY are drop forgings, made of best quality steel, heat-treated and hardened. The threaded portion of jaws form a half nut for the setting-up screws. Have stood the test of heavy duty work in our own shops where accuracy was the only accepted standard.

DOMINION STEEL PRODUCTS CO.
LIMITED
Engineers • Manufacturers
BRANTFORD, CANADA

3

PATENTS
ATTORNEYS

PATENTS
Fetherstonhaugh & Co.,
The old established firm. Patents everywhere. Head office Royal Bank Bldg., Toronto. Ottawa office, 5 Elgin St. Offices throughout Canada. Booklet Free.

BLACK DIAMOND OVENS
OVENS
Japanning and Varnishing Ovens heated by Gas, Electricity, Steam or Coal. Kernchen Siphonage Ventilators, Bakers' Ovens, trucks, casters, etc. Write for Booklet
Brantford Oven & Rack Co. Ltd.
Brantford, Canada

PAPER MILL MACHINERY
BERTRAMS LIMITED
SCIENNES EDINBURGH

Classified Opportunities

MACHINERY WANTED

WANTED — ONE USED WATER CINDER mill. State length of time machine has been used, condition and where it can be examined. State lowest net price. G. W. McFarlane Engineering Limited, Paris, Ont.

WANTED—NEW AND RE-MANUFACTURED gas and gasoline engines, boilers, saw-mill machinery, planing mill and sash and door factory machinery. New and manufactured iron and wood-working machinery. Electric motors, dynamos, direct connected steam operated generators, portable electric tools. Builders' hoists, elevators. Box 739F, Canadian Machinery.

IF YOU HAVE IRON-WORKING OR WOOD-working machines for sale, or idle machine shop equipment, call or write Canada's largest dealers in new and used machinery. H. W. Petrie Limited, Toronto, Ont. (cfm)

GEARED POWER PRESS, 4" STROKE OR more.
No. 21 Power Press.
16" or 18" Bulldozer.
Bradley Hammer.
20" Shaper.
16" or 18" Lathe.
20" Drill.
500 to 800 lb. Drop Hammer.
State condition and prices. Box 718, Canadian Machinery.

WANTED — WOODWORKING MACHINERY and mining machinery, machine tools, boilers and steam pumps, alternating or direct current motors. Contractors' equipment. Apply Box 737F, Canadian Machinery.

Machinery Wanted

Advertisements under this heading will be inserted once free of charge. Readers are invited to use this department when in need of equipment. Replies may be sent to box number, care of Canadian Machinery, if desired.

MACHINERY FOR SALE

1—24" x 12' Canadian Machinery Lathe
2—22' x 10' Davies Lathes.
1—21" x 10' London Lathe.
6—20" x 8' C.M.C. Lathes.
1—18" x 8' Mueller Lathe.
3—19" x 8' C.M.C. Lathes.
1—18" x 8' London Lathe.
1—16" x 8' C.M.C. Lathe.
1—16" x 6' McDougall Lathe.
1—D-1 H. D. Colburn Drill.
2—No. 24 H. D. Foote-Burt Drills.
1—28" B. G. Barnes Drill.
1—22" B. G. Barnes Drill.
1 D.C. Compound Wound Generator, 110 Valts, 125 Amp.
2—No. 54 Perkins Sprue Cutters.
2—2" x 26" Pratt & Whitney Turrets.
1—10" x 52" Plain Landis Grinder.

Write us for particulars and prices.

Box 751 F.

Canadian Machinery

Phone Park. 3550 House: Coll. 9660W
197 Clinton Street, Toronto
A. AUSTIN
GENERAL MACHINE WORK
Turret Lathe and Automatic Screw Machine a Specialty. Let us quote on your work.
With: Garlock, Walker Machinery Co.
163 Dufferin Street.

Grey Iron Castings

Light and Medium-Bench and Floor Repetition Castings; Capacity 15 tons per day.
Expert Metal and Wood Pattern Work. Our advice and estimates will save you money.
Semi-finishing operations on Lathe or Grill on Castings supplied if required
ASK US.
THE KATIE FOUNDRY, GALT, ONT.

Modern Marine Machinery

Automatic Steam Towing Machines, Ship Windlasses, Cargo and Deck Winches, Steam Capstans, Dock Gypsies, Steering Engines, Hydraulic Freight Hoists, etc. Grey Iron and Brass Castings. Special machinery built to order. The Corbet Foundry & Machine Co., Limited, Owen Sound, Ont. (52)

Used Belting, Pulleys, Etc.

We carry right in stock a large quantity of used Belting, Pulleys, Hangers, Shafting, etc., in good condition, which we sell at half the price of new. Inquiries solicited. In writing mention sizes wanted. L. S. Tarshis & Sons, 92 Wellington St., Montreal.

CLOSING TIME

Advertisements for this section must be in our composing room Tuesday morning prior to day of issue.

In order that the announcements of your wants, machinery for sale, etc., etc., shall not be delayed, please try to have them in our office with the Tuesday morning mail.

Canadian Machinery

REGO
WELDING
and
CUTTING APPARATUS

Oxygen, Acetylene, and a complete line of Welding and Cutting Supplies.

Carter Welding Co.
of Toronto, Limited
7-11 Sheppard St., Toronto, Ont.
Phones: Adelaide 2841 and 1524
(TF)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (ctfm)

BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

AGENTS WANTED

AMERICAN FIRM, SPECIALIZING IN OXY-acetylene welding and cutting equipment, is desirous of securing representatives and agents in Canada. Apply Box 763F, Canadian Machinery.

BUSINESS CHANCES

WANTED BY AN ESTABLISHED CONCERN. Twelve to fifteen thousand dollars for a period of from one to three years, to take care of business expansion. This concern will stand the fullest investigation. 8% is offered with ample security to principals only, with an opportunity of becoming permanent associates with the partners, if mutually satisfied. Box 767, Canadian Machinery. (ctfm)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

MACHINE WORK WANTED

We are equipped to handle all kinds of general or special machine work. All operations in our plant are done under the most careful supervision and we can satisfy you as to price. Always available for consultation.

PERFECT MACHINE COMPANY, GALT
Builders of Reliable Machinery.

CANADIAN MACHINE SHOP

Will handle medium Specialty Line — Manufacturing and Selling

Apply Quickly

Box No. 715F
CANADIAN MACHINERY

Classified Opportunities

USED MACHINERY

TWO HUNDRED AND FIFTY MACHINES

Boring Mills,
Bolt and Nut Machinery,
Pressure Blowers,
Drilling Machines,
Grinders,
Hydraulic Presses,
Keyseating Machines,
Engine Lathes,
Gap Lathes,
Turret Lathes,
Wheel Lathes,
Axle Lathe,
Automatic Turret Lathes,
Milling Machines,
Metal Planers,
Punches and Shears,
Rotary Shears,
Angle Shears,
Beam Shears,
Gate Shears,
Plate Planer,
Rotary Planer,
Pneumatic Riveters,
Geared Presses,
Pipe Machines,
Plate Straightening Rolls,
Plate Bending Rolls,
Shapers,
Slotters,
Saws,
Band Saws,
Wood Planers,
Moulders,
Band Re-Saw Tenon Machine,
Wood Shaper,
Wood Lathes,
Buzz Planers,
Timber Planer,
Etc., Etc.

Used Machinery Dept.

Canadian Allis-Chalmers Limited
Cor. King and Simcoe Sts., Toronto
Phone A. 4323

Prices Adjusted to Meet Present Conditions and in Order to Make a Quick Turnover I Will Sell the Following Machines:

22 x 10 REED, 3 step cone S.B.G., S.Q.C.
22 x 10 MILWAUKEE, 3 step cone D.B.G., S.Q.C.
21 x 8 LEBLOND, 3 step cone D.B.G., Q.C.G.
20 x 10 WALCOTT, 3 step cone D.B.G., Q.C.G.
20 x 10 REED PRENTICE, 3 step cone D.B.G., Q.C.G.
20 x 8 WALCOTT, 3 step cone D.B.G., Q.C.G.
18 x 8 MUELLER, 3 step cone D.B.G., Q.C.G.

Miscellaneous

10 x 24 LANDIS Grinder, rebuilt, complete.
5-ton Pneumatic Hoist, 70-lb. pressure.
20" BARNES Drill, wheel and lever feed.
No. 9 HENDEY WHITMORE double end Punch and Shear, ½" in ½".
No. 4 Greenard Arbor Press, complete.
24" Shaper.
Bolt Cutter, solid head, ¼" to 1" capacity.
72" x 18' Robb Armstrong H.R.T. Boiler, 100 lbs.
LeBlond Cutter and Reamer Grinder.
16" Walcott D.B. Shaper.

LOTS OF OTHER BARGAINS IN REBUILT TOOLS. Let me have your requirements and I will convince you that my prices are right.

R. S. HOLLY
Suite 502 Kent Building
TORONTO, ONTARIO
Phone Adel. 3147

GARLOCK-WALKER LIST

Prospective buyers of machine tools will find in our list of slightly used and rebuilt machines many items that will interest them.

Our present stock for immediate delivery is one of the largest in Canada.

Send us your enquiries.

LATHES
1—30" x 12' "Blaisdell" (used).
1—30" x 14' "Niles-Bement-Pond" (used).
1—26" x 14' Niles-Bement-Pond, 2 C.G., (used.
1—24" x 10' "Milwaukee" (new).
1—18" x 8' Rae, Q.C.G. (new).
1—16" x 6' Reed, Q.C.G. (used).
1—12" x 8' "LeBlond" Tool Room (used).
1—12" x 6' Worcester, Q.C.G. (used).
1—8" "Rivett" with Cabinet, several attachments, (used).
1—7" Cataract Precision, several attachments (used).

GAP LATHES
1—38" x 54" x 12' Bertram (used).
1—22" x 40" x 16' McDougall (used).
1—21" x 30" x 7' South Bend.
1—20" x 38" x 12' C.M.C. (used).

TURRET LATHES
No. 4 Millhollands, capacity 1⅝" (used). Several Davis and other makes. Various capacities.

SHAPERS
1—16" "MacKenzie" B.G. Crank Shaper, (new).
1—16" "Rae" B.G. Crank Shaper (slightly used).
1—24" "McGregor-Gurley" B.G. Crank Shaper (used).

PLANERS
1—42" x 42" x 20' Putnam, 1 head (used).
1—30" x 30" x 10' Pond, 1 head (used).
1—24" x 24" x 6' Powell, 1 head (new).

MILLING MACHINES
1—Briggs High Duty, Type "A," 22" Traverse (new).
1—Briggs High Duty, Type "B," 42" Traverse (new).
1—Whitney Hand Miller, 18" x 6" table (used).
1—No. 3 Ford-Smith Plain (used).
1—No. 3 Ford-Smith Universal (used).
1—No. 4 Cincinnati Plain (used).

DRILLS
1—10" Burke Sensitive (Bench type) (new)
1—16" No. 2B Edlund H.S. Sensitive (new)
20" "Sibley," "Champions," "Rockwell" and "Silver" (new) and (used).
1—36" C.M.C. Heavy Duty (used).
1—3-spindle 20" Silver Gang Drill (used).
3—4-spindle W. & R. Sensitive (cap. ½") (used).

BORING MACHINES
1—66" Bement-Niles Vertical, 2 heads, 24" under rail (used).
1—Universal No. 2½ Horizontal Table, 42" x 22" (used).
1—Bullard "New Era" Vertical Turret, 36", complete equipment (new).

POWER HACK SAWS
1—No. 10 Racine 8" x 8" Cap. (new).
1—No. 7 Watkins 9" Cap., 18" Blade (used).
1—No. 1, 6" x 6" Racine (used).
1—No. 3 Robertson 6" x 6" (used).

AIR COMPRESSORS
1—8" x 8" Sullivan, Class W.G.-3, Belt driven (used).
1—8 x 10 x 8 Bury, Steam driven (used).
1—12" x 18" Ingersoll-Sargent, belt drive (used).
1—12" x 12" Can. Ingersoll Rand NE-1 (used).

GRINDING MACHINES
1—Landis No. 4 Universal (used).
1—Landis Plain, self-contained, 36" x 12" (used).
1—Fitchburg Cylindrical, 8" x 36" (new). Several Tool and Cutter Grinders (new) and (used). "Globe," "Stevens," "LeBlond" and "Cincinnati."

MISCELLANEOUS
2—No. 4 Jno. Hall Pipe Machines (1 used) (1 new).
1—Lennox Rotary Bevel Shear, 1" Cap. (new).
1 "High Speed" Riveting Hammer, No. 3A (used).
1—Beaudry Champion Power Hammer, No. 9 (used).
1—"Grant" Rivet Spinning Machine, No. 80A, (new).
1—"Grant" Rivet Spinning Machine, No. 80B, (used).
1—Arbor Press, No. 4 "Greenerd" (new).

ALSO EVERYTHING IN WOODWORKING MACHINERY.

GARLOCK-WALKER MACHINERY CO., LIMITED
MONTREAL, 337 St. James St. TORONTO, 32 Front St. W. WINNIPEG, 567 Banning Ave.
Warehouse: 163 Dufferin Street, Toronto

DIAMOND TOOLS

FOR TRUEING GRINDING WHEELS

QUALITY SERVICE SATISFACTION

INDUSTRIAL GEMS

Tools For All Mechanical Purposes

FURNISS CLARKE & COMPANY

364 University St.

MONTREAL

Sole Canadian Agents for

THE JOYCE-KOEBEL COMPANY, INC.

Formerly Geo. A. Joyce Co, Ltd.

NEW YORK LONDON

SHAFTING

Cold Drawn, Turned and Polished Steel, Rounds, Squares, Hexagons and Flats, Steel Piston Rods, Pump Rods.

Special facilities for Keyseating up to 6 in. diameter.

THE

Canadian Drawn Steel Co.

LIMITED

HAMILTON CANADA

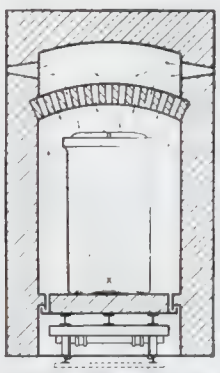
USES and LIMITATIONS

of

Car Type and Car-and-Ball Type Furnaces

W. S. ROCKWELL CO. INDUSTRIAL ESTABLISHED 1888 FURNACES NEW YORK

are clearly defined in Bulletin 222-T



Irregular heating of high charge in car furnace, showing tendency to overheat at the top and formation of cold zone (X) at bottom due to comparatively cold hearth

Typical installations are shown to illustrate—

The applicability of car type and car-and-ball type furnaces to the heat-treatment of material that cannot be advantageously handled in other types of furnaces.

Factors governing selection of the type (car or car-and-ball) best suited to individual manufacturing requirements.

Difference in design of each type.

Influence of unequal cooling on the quality of finished product.

In brief, this bulletin is a discussion of principles which will appeal to those interested in furnace design, loading and handling methods, heat generation and utilization, etc.

Write for Bulletin 222-T

W. S. ROCKWELL COMPANY

Furnace Engineers and Contractors

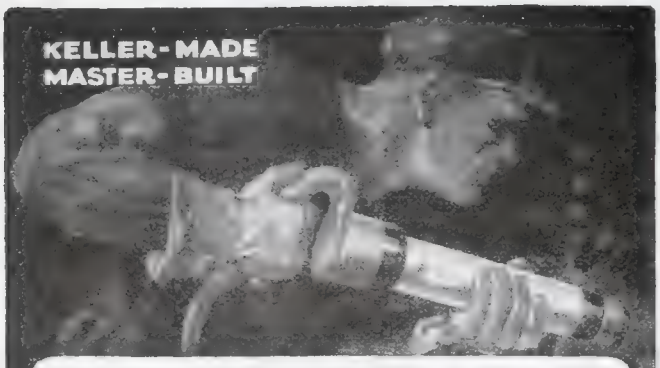
50 Church St. (Hudson Terminal Bldg.) New York

We make Industrial Heating Furnaces for every requirement

"FURNACE AND FUEL TO SUIT CONDITIONS"

Canadian Representative

R. J. McLean, 604 Southam Building, Montreal, P.Q.



THANKS—

To Mr. Wm. H. Keller—a line of Pneumatic Tools has been especially designed and built for your particular industry. Get our proposition on KELLER-MASTER:

Chipping Hammers
Riveting Hammers
Scaling Hammers
Staybolt Riveters
Jam Riveters
Holders-on
Corliss Valve Drills
Valveless Drills
Sand Rammers
Rotary Grinders
Rivet Cutters
Accessories

COMPLETE CATALOGUE ON REQUEST

KELLER PNEUMATIC TOOL COMPANY

GRAND HAVEN • MICHIGAN • U·S·A·

BANK OF NOVA SCOTIA BLDG., MONTREAL

A BALATA BELTING

Which We Guarantee Second To None And Entirely Satisfactory

Try One And Be Convinced

J.C.McLAREN BELTING CO.

Limited

MONTREAL TORONTO WINNIPEG

TRADE MARK

THE J.C. McLAREN BELTING CO LIMITED

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

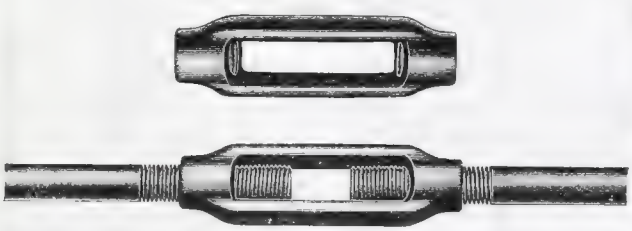
GEARS AND PINIONS
Any Kind of Gear
We make a specialty of rawhide and silent Micarta Pinions for noiseless drives.
"Hurry Orders and Break-Down Jobs" receive special attention.
Try a catalogue—it's interesting, and contains a lot of gear data.
Philadelphia GEAR Works
Vine St., Philadelphia, Pa.

CUT GEARS

For
Good Gears
Write
Hamilton Gear & Machine Co.
Van Horne St.
TORONTO

CANADA FOUNDRIES & FORGINGS LIMITED

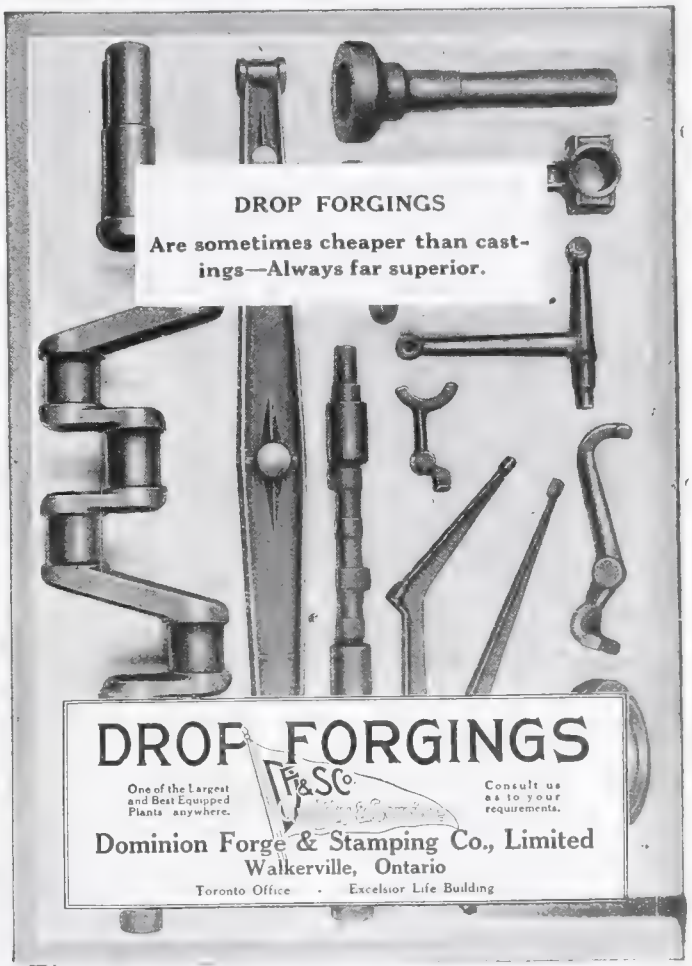
Drop Forged Steel



SOLID—NOT WELDED

16 Sizes with / without } Stubs

Canada Foundries & Forgings
Welland, Ont.



DROP FORGINGS
Are sometimes cheaper than castings—Always far superior.

DROP FORGINGS
One of the Largest and Best Equipped Plants anywhere.
Consult us as to your requirements.
Dominion Forge & Stamping Co., Limited
Walkerville, Ontario
Toronto Office - Excelsior Life Building

OAKITE CLEANS

Put your Cleaning Problems up to us.

OAKLEY CHEMICAL CO
44 THAMES STREET · NEW YORK

STEEL CASTINGS

We shall be glad to supply, by addition to our General Catalogue, literature on
Steel Castings | Lithographed
Galvanizing | Ware
Wire Goods | Enamelled
Stoves | Signs

Made by the Acid Electric process up to fifteen tons. Castings made by this process are free from blow holes, easy to machine, and superior in every way to ordinary Steel Castings.

Castings supplied for shipbuilding, car, locomotives, all classes of machinery, etc.

Write for Circular No. 15.

The Thos. Davidson Mfg. Co. Limited

Head Office: Montreal.
Branches: Toronto and Winnipeg.

Steel Foundry Division:
Lachine Canal, Turcot.

DAVIDSON

QUALITY and QUANTITY CIRCULATION

The Facts are in Demand

THE careful buyer of advertising space demands to know the exact quality and quantity of circulation of the medium he has under consideration. Mere claims won't do any more. Cold facts must be produced—facts beyond the shadow of doubt.

Advertisers who place their messages through the columns of the MacLean Technical Papers find they get both quality and quantity circulation.

Both of these facts are actually proven by the Audit Bureau of Circulations. This A.B.C. statement counts only bona-fide, paid-for circulation. It refuses to include copies printed and distributed as specimen copies or as "bulk" subscriptions, and it tells you definitely just what kind of people read these papers.

The MacLean Technical Papers are well established. permanent powers to which anyone may turn with confidence.

Canadian Machinery
(Weekly)

Power House
(Semi-Monthly)

Canadian Foundryman
(Monthly)

Marine Engineering
(Monthly)

Pledges of Truth Required

THROUGHOUT Canada you will find the great majority of sober, thinking Business Men, Engineers and Mechanics, conscientious readers of one or more of the MacLean Technical Papers. In building up this clientele of responsible readers the MacLean membership to the **Canadian National Newspapers and Periodicals Association** exerts an important influence.

Enrolment in this association demands the following pledges—"To consider first the interests of the Subscriber." "To work for truth and honesty in all departments, and among other things to supply advertisers with full information regarding character and extent of circulation."

Rigid adherence to the principles set forth above have resulted in the MACLEAN papers becoming the greatest disseminators of technical information and trade news in the British Empire.

THE monthly, semi-monthly and weekly publishing of the four papers listed above is a task that demands the utmost from a thoroughly capable organization. Technical men with years of practical experience present articles and editorials of a "better business" nature. Advertising men of proven ability plan campaigns and assist in the preparation of copy. Typesetters, press operators, proof readers, artists and even the messengers work with the all impelling incentive of better accomplishment.

To this spirit of splendid co-operation is credited the growth from a small beginning to what is now the largest publishing business of its kind in the British Empire.

THE MACLEAN PUBLISHING CO., LIMITED

143-153 University Avenue, TORONTO, CANADA

MONTREAL, WINNIPEG, VANCOUVER, NEW YORK, BOSTON, CHICAGO, CLEVELAND, LONDON, ENG.

Canadian Machinery BUYERS DIRECTORY

If what you want is not here, write us, and we will tell you where to get it. Let us suggest that you consult also the advertisers' index—last page of book, after having secured advertisers' names from this directory. The information you desire may be found in the advertising pages. This department is maintained for the benefit and convenience of our readers. The insertion of our advertisers' names under proper headings is gladly undertaken, but does not become part of an advertising contract.

Abrasive Discs
Norton Co. of Can., Ltd., Hamilton, Ont.
Oakey & Sons, Ltd., John London S.E., Eng.
Ritchey Supply Co., Toronto, Ont.
Wausau Abrasives Co., Chicago, Ill.

Abrasive Materials
Can. Hart Products, Ltd., Hamilton, Ont.
Dom. Abrasive Wheel Co., Ltd., Mimico, Ont.
Norton Co. of Can., Ltd., Hamilton, Ont.
Oakey & Sons, Ltd., John, London, S.E., Eng.
Waltham Grinding Wheel Co. of Canada, Ltd., Brantford, Ont.
Ritchey Supply Co., Toronto, Ont.
Wausau Abrasives Co., Chicago, Ill.

Acetylene, Dissolved
L'Air Liquide Society, Toronto, Ont.

Accumulators, Hydraulic
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Stewart & Co., Duncan, Glasgow, Scot.

Air Lifts
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.

Air Purifiers and Coolers
Sturtevant Co., B. F., Boston, Mass.

Analyses, Chemical
Toronto Testing Laboratory, Toronto, Ont.

Angle Bars
Steel Co. of Canada, Ltd., Hamilton, Ont.

Anvils
Aikenhead Hardware Ltd., Toronto, Ont.
Atkins & Co., Inc., E. C., Indianapolis, I.
Columbia Hdwe. Division, Cleveland, O.
Petrie, Ltd., H. W., Toronto, Ont.

Arbors
Atkins & Co., Inc., E. C., Indianapolis, I.
Brown & Sharpe Mfg. Co., Providence, R.I.
Cleveland Twist Drill Co., Cleveland, O.
Ford-Smith Machine Co., Hamilton, Ont
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Jacobs Mfg. Co., Hartford, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Skinner Chuck Co., New Britain, Conn.

Axles, Car
Dom. Foundries & Steel, Hamilton, Ont.

Babbitt Metal
Atkins & Co., Inc., E. C., Indianapolis, I.
British Smelting & Refining Co., Ltd., Montreal, Que.
Canada Metal Co., Ltd., Toronto, Ont.
Fisher Motor Co., Ltd., Orillia, Ont.
Hoyt Metal Co., Toronto, Ont.
Magnolia Metal Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.

Balls, Brass, Bronze and Steel
Canada Foundries & Forgings Co., Welland, Ont.
Canadian SKF Co., Toronto, Ont.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Railway Roller Bearing Co., Syracuse, N.Y.

Barrels, Tumbling
Baird Machine Co., Bridgeport, Conn.
McDougall Co., Ltd., R., Galt, Ont.

Bars, Boring
Armstrong Bros. Tool Co., Chicago, Ill.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Gisholt Machine Co., Madison, Wis.
Madison Mfg. Co., Muskegon, Mich.

Bars, Boring, Portable
Underwood Corp., H. B., Philadelphia, Pa.

Bars, Bronze Cored
Moore & Son, Thos., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.

Bars, Iron
Steel Co. of Canada, Ltd., Hamilton, Ont.

Bars, Steel
Algoma Steel Corp., Ltd., Sault Ste. Marie, Ont.
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Canada Foundries & Forgings Co., Welland, Ont.
Can. Steel Foundries, Montreal, Que.
Dom Foundries & Steel, Hamilton, Ont.
N. S. Steel Co., Ltd., New Glasgow, N.S.
Ontario Metal Products Co., Ltd., Toronto, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Steel Co of Canada, Ltd., Hamilton, Ont
United Alloy Steel Corp., Canton, Ohio.
Vanadium Alloys Steel, Latrobe, Pa.

Bearings, Ball
Canadian SKF Co., Toronto, Ont.
Chapman Double Ball Bearing Co., Toronto, Ont.
Lang Mfg. Co., Guelph, Ont.
Lyman Tube & Supply Co., Montreal, Que.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Railway Roller Bearing Co., Syracuse, N.Y.

Bearings, Bronze
Tallman Brass & Metal Co., Hamilton, Ont.
Railway Roller Bearing Co., Syracuse, N.Y.

Bearings, Die-Cast
Fisher Motor Co., Ltd., Orillia, Ont.
Franklin Die-Casting Corp., Syracuse, N.Y.
Tallman Brass & Metal Co., Hamilton, Ont.

Bearings, Journal
Fisher Motor Co., Ltd., Orillia, Ont.
Tallman Brass & Metal Co., Hamilton, Ont.

Bearings, Roller
Can. Fairbanks-Morse Co., Ltd., Montreal.
Lang Mfg. Co., Guelph, Ont.
Lyman Tube & Supply Co., Montreal, Que.
Morrow Screw & Nut Co., Ltd, John, Ingersoll, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Railway Roller Bearing Co., Syracuse, N.Y.

Belt Cement
Graton & Knight Mfg. Co., Worcester, Mass.
McLaren Belting Co., J. C., Montreal, Que.

Belt Clamps
Graton & Knight Mfg. Co., Worcester, Mass.

Belt Dressings and Fillers
Aikenhead Hardware Ltd., Toronto, Ont.
Dom. Belting Co., Ltd., Hamilton, Ont.
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.

Belt Fasteners
Can. Consolidated Rubber Co., Ltd., Montreal, Que.
Clipper Belt Lacer Co., Grand Rapids, Mich.
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
McLaren Belting Co., J. C., Montreal, Que.
Rice Lewis & Son, Ltd., Toronto, Ont.

Belt Hooks
Torrington Co., Ltd., Upper Bedford, Que

Belt Lacing
Clipper Belt Lacer Co., Grand Rapids, Mich.
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
McLaren Belting Co., J. C., Montreal, Que.

Belt Lacing, Steel
Flexible Steel Lacing Co., Chicago, Ill.

Belt Lacing, Hinged
Flexible Steel Lacing Co., Chicago, Ill.

Belt Lacing, Flexible Steel
Flexible Steel Lacing Co., Chicago, Ill

Belt Lacing Machines
Clipper Belt Lacer Co., Grand Rapids, Mich.
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
McLaren Belting Co., J. C., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.

Belt Joiners, Conveyor
Flexible Steel Lacing Co., Chicago, Ill.

Belt Tools
Graton & Knight Mfg. Co., Worcester, Mass.

Belting, Chain
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Lyman Tube & Supply Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Renold (Hans) of Canada, Ltd., Montreal, Que.

Belting, Fabric
Atkins & Co., Inc., E. C., Indianapolis, I.
Can. Consolidated Rubber Co., Ltd., Montreal, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Goodyear Tire & Rubber Co. of Can., Ltd., Toronto, Ont.
Dom. Belting Co., Ltd., Hamilton, Ont.
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
McLaren Belting Co., J. C., Montreal, Que.
Sumner & Co., New York City.

Belting, Leather
Atkins & Co., Inc., E. C., Indianapolis, I.
Can. Fairbanks-Morse Ltd., Montreal. Q.
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
McLaren Belting Co., J. C., Montreal, Que.
Smith Belting Co., Toronto, Ont.
Sumner & Co., New York City.
Tullis & Son, Ltd., John, Glasgow, Scot.

Belting, Rubber
Can. Consolidated Rubber Co., Ltd., Montreal, Que.
Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.
Gutta Percha & Rubber, Toronto, Ont.
Quaker City Rubber Co., Philadelphia, Pa.

Belts, Abrasive
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
Oakey & Sons, Ltd., John, London, S.E., Eng.

Bench Countershaft Standards
Ford-Smith Machine Co., Hamilton, Ont.

Benches, Work
Aikenhead Hardware Ltd., Toronto, Ont.

Bending Machines, Power
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Bertrams Ltd., Edinburgh, Scotland.
Brown, Boggs & Co., Ltd., Hamilton, Ont
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy Co., Toronto, Ont
Williams Machinery Co., A. R., Toronto, Ont.

Bins, Ore
MacKinnon Steel Co., Sherbrooke, Que.

Blocks
Ford Chain Block Co., Philadelphia, Pa
Wright Mfg. Co., Lisbon, Ohio.

Blocks, Chain (See Hoists, Hand)
Aikenhead Hardware Ltd., Toronto, Ont
Can. Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block Co., Philadelphia, Pa.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio.

Blocks, Die
Canada Foundries & Forgings Co., Welland, Ont.
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Dom. Foundries & Steel, Hamilton, Ont.
Fisher Motor Co., Ltd., Orillia, Ont.
Swedish Crucible Steel Co. of Canada, Ltd., Windsor, Ont.

Blocks, Pillow
Can. Link-Belt Co., Toronto, Ont.

Blowers
Can. Blower & Forge Co., Ltd., Kitchener.
General Combustion Co. of Can., Ltd., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Sheffield Engineering Supplies, Ltd., Montreal, Que.
Skinner Bros. Mfg. Co., Inc., St. Louis, Mo
Sturtevant Co., B. F., Boston, Mass.

Bolt and Nut Machinery
Acme Machinery Co., Cleveland, Ohio
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Garlock-Walker Mchy Co., Toronto, Ont.
Greenfield Tap & Die Corp., Galt, Ont
Landis Machine Co., Inc., Waynesboro, Pa
National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.

Bolt and Nut Machinery, Automatic
National Acme Co., Cleveland, Ohio.

Bolts and Nuts
London Bolt & Hinge Works, London, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
National Acme Co., Cleveland, Ohio.
N. S. Steel Co., Ltd., New Glasgow, N.S.
Petrie, Ltd., H. W., Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

Bolt Threading Die Heads
Jones & Lamson Machine Co., Springfield, Vermont.
Landis Machine Co., Inc., Waynesboro, Pa

Boosters
Sturtevant Co., B. F., Boston, Mass

Boring and Turning Mills, Vertical
Armstrong Whitworth of Canada, Ltd., Montreal, Canada.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Herbert Ltd., Alfred, Toronto, Ont.

Boring, Drilling and Milling Machines, Horizontal
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy Co., Toronto, Ont
Gisholt Machine Co., Madison, Wis.
Herbert Ltd., Alfred, Toronto, Ont.
Landis Tool Co., Waynesboro, Pa.

Boring, Drilling and Milling Mach., Vertical
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
McDougall Co., Ltd., R., Galt, Ont
Oliver Machinery Co., Grand Rapids, Mich.
Petrie, Ltd., H. W., Toronto, Ont.

Boring Heads
Aikenhead Hardware Ltd., Toronto, Ont.

Boring Tools
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Armstrong Bros. Tool Co., Chicago, Ill
Gisholt Machine Co., Madison, Wis.

Brakes, Magnetic (for electric furnaces)
Volta Mfg. Co., Welland, Ont.

Brass
Brown's Copper & Brass Rolling Mills Ltd., Toronto, Ont.
Ontario Metal Products Co., Ltd., Toronto, Ont.

Bricks, Fire
Elk Firebrick Co. of Can., Ltd., Hamilton, Ont.

Bridges
Hamilton Bridge Works Co., Ltd., Hamilton, Ont.
MacKinnon Steel Co., Sherbrooke, Que

Broaching Machines
Bilton Machine Co., Bridgeport, Conn
Garlock-Walker Mchy. Co., Toronto, Ont

Bronze
Brown's Copper & Brass Rolling Mills, Ltd., Toronto, Ont.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.
Ontario Metal Products Co., Ltd., Toronto, Ont.

Bronze, Phosphor
British Smelting & Refining Co., Ltd., Montreal, Que.
Canada Metal Co., Ltd., Toronto, Ont
Ontario Metal Products Co., Ltd., Toronto, Ont.

Bucket Carriers, Pivoted
Can. Link-Belt Co., Toronto, Ont.

Buffing or Polishing Machines (See Polishing and Buffing Machines)
Blount Co., J. G., Everett, Mass
Can. Hanson & Van Winkle Co., Ltd., Toronto, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
U.S. Electrical Tool Co., Cincinnati, O

Bulldozers
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.

Burners, Oil and Gas
General Combustion Co. of Can., Ltd., Montreal, Que.
Rockwell Co., W. S., New York City

Bushings
Fisher Motor Co., Ltd., Orillia, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.

Cabinets, Oil
S. F. Bowser & Co., Ltd., Toronto, Ont.

Calipers
Brown & Sharpe Mfg. Co., Providence, R.I.
Starrett Co., L. S., Athol, Mass.

Cams
Canada Foundries & Forgings Co., Welland, Ont.

Can-Making Machinery (See Sheet Metal Working Machinery
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Ltd., Hamilton, Ont
MacKinnon Steel Co., Sherbrooke, Que

BUYERS' DIRECTORY

Union Carbide Co of Can., Ltd., Welland, Ont.

Cars, Ore
MacKinnon Steel Co., Sherbrooke, Que.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia
Can. Hanson & Van Winkle Co., Toronto, Ont
Canada Metal Co., Ltd., Toronto, Ont.
Tallman Brass & Metal Co., Hamilton, Ont.

Castings, Brass and Bronze
Algoma Steel Corp., Ltd., Sault Ste. Marie, Ont.
Canada Electric Castings Co., Ltd., Orillia.
Can. Hanson & Van Winkle Co., Toronto, Ont.
Canada Metal Co., Ltd., Toronto, Ont.
Can. Driver-Harris Co., Walkerville, Ont
Electric Steel & Engineering Co., Welland, Ont.
Tallman Brass & Metal Co., Hamilton, Ont.

Castings, Copper
Can. Hanson & Van Winkle Co., Toronto, Ont.
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Castings, Marine
Can. Steel Foundries, Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

Castings, Die Molded
Fisher Motor Co., Ltd., Orillia, Ont.
Franklin Die-Casting Corp., Syracuse, N.Y.
Katie Foundry Co., Galt, Ont.
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Castings, Ferro-Alloy
Can. Steel Foundries, Montreal, Que.

Castings, Iron
Algoma Steel Corp., Ltd., Sault Ste Marie, Ont.
Bernard Industrial Co., A., Fortierville, Que.
Bilton Machine Co., Bridgeport, Conn.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Can. Hanson & Van Winkle Co., Toronto, Ont.
Canada Electric Castings Co., Ltd., Orillia
Hanna & Co., M. A., Cleveland, Ohio.
Hepburn Ltd., John T., Toronto, Ont.
Katie Foundry Co., Galt, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
McDougall Co., Ltd., R., Galt, Ont.
Victoria Foundry Co., Ltd., Ottawa, Ont.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Castings, Hyd. Press
Can. Steel Foundries, Montreal, Que.

Castings, Monel Metal
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

Castings, Naval Bronze
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Castings, Nichrome
Can Driver-Harris Co., Walkerville, Ont.

Castings, Nickel
Can. Hanson & Van Winkle Co., Toronto, Ont.

Castings, Semi-Steel
Davidson Mfg. Co., Thos., Montreal, Que.
Hull Iron & Steel Foundries, Hull, Que.
Katie Foundry Co., Galt, Ont.
Manitoba Steel Foundries, Ltd., Winnipeg, Man.

Castings, Steel
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Can. Steel Foundries, Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.
Swedish Crucible Steel Co. of Can., Ltd., Windsor, Ont.

Cements, Iron
Smooth Mfg. Co., Jersey City, N.J.

Centering Machines
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.

Chains (See Sprockets and Chains)
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.
Renold (Hans) of Canada, Ltd., Montreal, Que.
Wright Mfg. Co., Lisbon, Ohio.

Chains, Driving
Can. Link-Belt Co., Toronto, Ont.
Greenfield Tap & Die Corp., Galt, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Renold (Hans) of Canada, Ltd., Montreal, Que.
Wright Mfg. Co., Lisbon, Ohio.

Chasers
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Jones & Lamson Machine Co., Springfield, Vt
Landis Machine Co., Inc., Waynesboro, Pa.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Chemists
Toronto Testing Laboratory, Toronto, Ont.

Chucking Machines
Acme Machine Tool Co., Cincinnati, Ohio
Brown & Sharpe Mfg. Co., Providence, R.I.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vermont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Steinle Turret Machine Co., Madison, Wis.
Warner & Swasey Co., Cleveland, Ohio.

Chucks, Drill
Jacobs Mfg. Co., Hartford, Conn.

Chucks, Drill and Tap
Aikenhead Hardware Ltd., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Canadian SKF Co., Toronto, Ont.
Cushman Chuck Co., Hartford, Conn.
Dom. Steel Products Co., Brantford, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Skinner Chuck Co., New Britain, Conn.
Union Mfg. Co., New Britain, Conn.
Williams & Wilson, Ltd., Montreal, Que

Chucks, Lathe
Aikenhead Hardware Ltd., Toronto, Ont.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Dom. Steel Products Co., Brantford, Ont.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Geometric Tool Co., New Haven, Conn.
Gisholt Machine Co., Madison, Wis.
Ker & Goodwin Machine Co., Brantford, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Union Mfg. Co., New Britain, Conn.
Williams & Wilson, Ltd., Montreal, Que.

Chucks, Magnetic
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Chucks, Planer
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.
Union Mfg. Co., New Britain, Conn.

Chucks, Vertical Boring Mill
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Gisholt Machine Co., Madison, Wis.
Skinner Chuck Co., New Britain, Conn.
Union Mfg. Co., New Britain, Conn.

Clamps, Machinists'
Columbia Hdwe. Division, Cleveland, O.
Dickow, Fred C., Chicago, Ill.
Starrett Co., L. S., Athol, Mass.

Cleaners, Metal, Waste, General
Oakley Chemical Co., New York, N.Y.

Clocks, Time
Gisholt Machine Co., Madison, Wis.
International Business Machines Co., Toronto, Ont.

Clutches, Friction
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Johnson Machine Co., Carlyle, Manchester, Conn.
Positive Clutch & Pulley Works, Toronto, Ont.

Coal and Ash Handling Machinery
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.

Coal-Storage Systems
Can. Link-Belt Co., Toronto, Ont

Collars, Shaft or Set
Canada Foundries & Forgings Co., Welland, Ont.
Can. Link-Belt Co., Toronto, Ont.

Collets
Ackworthle, Ltd., John, Birmingham, Eng.
Butterfield & Co., Inc., Rock Island, Que.
Canada Machinery Corp., Galt, Ont.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Compounds, Carburizing, Case Hardening and Tempering
Cataract Refining Co., Toronto, Ont.

Compounds, Cleaning
Can Hanson & Van Winkle Co., Ltd., Toronto, Ont.
Oakley Chemical Co., New York, N.Y.

Compounds, Cutting, Drilling, Grinding, Screw Cutting
Atkins & Co., Inc., E. C., Indianapolis, I.
Cataract Refining Co., Toronto, Ont.
Oakley Chemical Co., New York, N.Y.

Compressors, Air
Curtis Pneumatic Machinery Co., St. Louis, Mo

Compressors, Air and Gas
Can. Fairbanks-Morse Co., Ltd., Montreal.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Garlock-Walker Mchy. Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.

Cones, Friction
Norton Co. of Can., Ltd., Hamilton, Ont.

Connecting Rods and Straps
Canada Foundries & Forgings Co., Welland, Ont.

Contract Work
Ford-Smith Machine Co., Hamilton, Ont.
Skinner Bros. Mfg. Co., Inc., St. Louis, Mo
Victoria Foundry Co., Ltd., Ottawa, Ont.

Conveyors and Elevators (See Elevators)
Jones & Glassco, Montreal, Que
Main Belting Co. of Can., Montreal, Que.
Mathews Gravity Carrier Co., Port Hope, Ont.

Conveyor Belt Joiners
Flexible Steel Lacing Co., Chicago, Ill.

Copper
Brown's Copper & Brass Rolling Mills, Ltd., Toronto, Ont.

Cored Bronze Bars
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Cotter Pins
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.

Counterbores
Cleveland Twist Drill Co., Cleveland, O
Eclipse Counterbore Co., Ltd., Walkerville, Ont.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Counters, Revolution
Aikenhead Hardware Ltd., Toronto, Ont.
Starrett Co., L. S., Athol, Mass.

Countershafts
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Foundries & Forgings Co., Welland, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Johnson Machine Co., Carlyle, Manchester, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
McDougall Co., Ltd., R., Galt, Ont.

Countersinks
Butterfield & Co., Inc., Rock Island, Que.
Eclipse Counterbore Co., Ltd., Walkerville, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Couplers, Car and Locomotive
Can. Steel Foundries, Montreal, Que.

Couplings, Flexible
Holden Co., Ltd., Montreal, Que.

Couplings, Rigid
Bernard Industrial Co., A., Fortierville, Que.

Couplings, Shaft
Bilton Machine Co., Bridgeport, Conn
Can. Link-Belt Co., Toronto, Ont.

Cranes, Electric
Bertram & Son Co., Ltd., The John, Dundas, Ont
Can. Link-Belt Co., Toronto, Ont
Dominion Bridge Co., Ltd., Lachine, Que
Hepburn Ltd., John T., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont
Shepard Electric Crane & Hoist Co., Montour Falls, N.Y.

Cranes, Hand (See Hoists, Hand)
Dominion Bridge Co., Ltd., Lachine, Que
Hepburn Ltd., John T., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont
Sheffield Engineering Supplies, Ltd., Montreal, Que.

Cranes, Locomotive
Can. Link-Belt Co., Toronto, Ont
Holden Co., Ltd., Montreal, Que.

Cranes, Traveling
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Ltd., Lachine, Que.
Hepburn Ltd., John T., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.

Crank Pin Turning Machines
Garlock-Walker Mchy Co., Toronto, Ont
Herbert Ltd., Alfred, Toronto, Ont.
Underwood Corp., H. B., Philadelphia, Pa.

Cutters, Flue
Holden Co., Ltd., Montreal, Que.

Cutters, Gear
Armstrong Whitworth Co. of Can., Ltd., Montreal, Que.
Brown & Sharpe Mfg. Co., Providence, R.I.
Butterfield & Co., Inc., Rock Island, Que.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Cutters, High Speed
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Atkins & Co., Inc., E. C., Indianapolis, I
Bilton Machine Co., Bridgeport, Conn
Butterfield & Co., Inc., Rock Island, Que.
Eclipse Counterbore Co., Ltd., Walkerville, Ont.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Kearney & Trecker Co., Milwaukee, Wis.
Madison Mfg. Co., Muskegon, Mich.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Cutters, Milling
Armstrong Whitworth of Canada, Ltd., Montreal, Canada.
Bilton Machine Co., Bridgeport, Conn
Brown & Sharpe Mfg. Co., Providence, R.I.
Butterfield & Co., Inc., Rock Island, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Milling Machine Co., Cleveland.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Kearney & Trecker Co., Milwaukee, Wis.
Morse Twist Drill & Machine Co., New Bedford, Mass.
Pilot Steel & Tool Co., Montreal, Que.

Cutters, Stay Bolt
Acme Machinery Co., Cleveland, Ohio.
Landis Machine Co., Inc., Waynesboro, Pa.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Cutters, Thread
Butterfield & Co., Inc., Rock Island, Que.
Greenfield Tap & Die Corp., Galt, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.

Cutting-Off Machines
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Garlock-Walker Mchy. Co., Toronto, Ont.
Greenfield Tap & Die Corp., Galt, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Starrett Co., L. S., Athol, Mass.

Cutting-Off Machines, Pipe (See Pipe Cutting and Threading Machines)
Landis Machine Co., Inc., Waynesboro, Pa.
McDougall Co., Ltd., R., Galt, Ont.
Williams Tool Corp. of Can., Ltd., Brantford, Ont.

Cutting-Off Tools
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Armstrong Bros. Tool Co., Chicago, Ill.
Pilot Steel & Tool Co., Montreal, Que.

Cutting Oil Filters (See Oil Filtering Systems)
Bowser, S. F., & Co., Ltd., Toronto, Can.
Cataract Refining Co., Toronto, Ont.

Cutting, Oxy-Acetylene
Carter Welding Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Perdue, W. B., San Francisco, Calif.
Prest-O-Lite Co. of Can., Toronto, Ont.
Turner Brass Works, Sycamore, Ill.
Union Carbide Co. of Can., Welland, Ont.

Cutting, Oxy-Hydrogen
National Electro Products, Ltd., Toronto, Ont.

Dealers, Machinery (See Searchlight Section)
Ford-Smith Machine Co., Hamilton, Ont
Petrie, Ltd., H. W., Toronto, Ont.

Deckle Straps
Can. Consolidated Rubber Co., Ltd., Montreal, Que.

Diamonds, Black and Rough
Joyce-Koebel Co., Inc., New York, N.Y.

Diamond, Carbon and Bortz
Joyce-Koebel Co., Inc., New York, N.Y.

Diamond Tools
Aikenhead Hardware Ltd., Toronto, Ont
Can. Desmond-Stephan Co., Hamilton Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Wheel Trueing Tool Co., Detroit, Mich.

Diamond Crossings
Can. Steel Foundries, Montreal, Que.

Die-Castings
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Dies, Pipe-Threading
Jones & Lamson Machine Co., Springfield, Vt.

Die Sinking Machines, Automatic
Jones & Lamson Machine Co., Springfield, Vt.
Walcott Lathe Co., Jackson, Mich

Die Sinkers
Kimber & Hillier, St. Catharines, Ont.

Dies, Screw and Thread Cutting
Ackworthie, Ltd., John, Birmingham, Eng.
Butterfield & Co., Inc., Rock Island, Que.
Greenfield Tap & Die Corp., Galt, Ont.
Jardine & Co., A. B., Hespeler, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio.

Dies, Sheet-Metal and Sub-Press (See Tool Work)
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Fisher Motor Co., Ltd., Orillia, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Toledo Machine & Tool Co., Toledo, Ohio.

BUYERS' DIRECTORY

Dies, Forging
Armstrong Whitworth of Canada, Ltd., Montreal, Canada.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Canada Foundries & Forgings Co., Welland, Ont.
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Kimber & Hillier Mfg. Co., St. Catharines, Ont.

Dies, Hammer
Kimber & Hillier, St Catharines, Ont

Dies, Self-Opening, Adjustable
Can. Fairbanks-Morse Co., Ltd., Montreal
Geometric Tool Co., New Haven, Conn.
Herbert Ltd., Alfred, Toronto, Ont.
Jones & Lamson Machine Co., Springfield, Vt
Landis Machine Co., Inc., Waynesboro, Pa
Murchey Machine & Tool Co., Detroit, Mich
National Acme Co., Cleveland, Ohio.
Prest-O-Lite Co. of Can., Toronto, Ont
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Victor Tool Co., Waynesboro, Pa.

Dies, Threading-Opening
Jardine & Co., A. B., Hespeler, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa
Morse Twist Drill & Machine Co., New Bedford, Mass.
Murchey Machine & Tool Co., Detroit, Mich
National Acme Co., Cleveland, Ohio
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Rapid Tool & Machine Co., Lachine, Que

Disc Cement
Ritchey Supply Co., Toronto, Ont
Wausau Abrasives Co., Chicago, Ill

Dividing Heads
Ackworthie, Ltd., John, Birmingham, Eng
Dickow, Fred. C., Machinery Co., Chicago, Ill.
Ford-Smith Machine Co., Hamilton, Ont
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee Wis
Petrie, Ltd., H. W., Toronto, Ont

Dogs, Lathe and Milling Machine
Armstrong Bros Tool Co., Chicago Ill

Drafting Boards and Tables
Darling Bros., Ltd., Montreal, Que.
Economy Drawing Table & Mfg. Co., Adrian, Mich.
Hughes Owens Co., Ltd., Montreal, Que

Drafting Materials
American Lead Pencil Co., New York City, N.Y.
Darling Bros., Ltd., Montreal, Que.
Economy Drawing Table & Mfg. Co., Adrian, Mich.
Hughes Owens Co., Ltd., Montreal, Que

Dressers, Grinding Wheel
Dom. Abrasive Wheel Co., Ltd., Mimico, Ont.
Ford-Smith Machine Co., Hamilton, Ont
Joyce-Koebel Co., Inc., New York, N.Y.
Norton Co. of Can., Ltd., Hamilton, Ont.
Oliver Machy Co., Grand Rapids, Mich

Drill Holders
Armstrong Bros Tool Co., Chicago, Ill

Drill Rods
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Aikenhead Hardware Ltd., Toronto, Ont.
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.

Drill Speeders
Canada Machinery Corp., Galt, Ont.

Drilling Machine Heads
Henry & Wright Mfg Co., Hartford, Conn.
Hoefer Mfg Co., Freeport, Ill.
United States Machine Tool Co., Cincinnati, Ohio.

Drilling Machines, Automatic
Hoosier Drilling Mach. Co., Goshen, Ind.
National Automatic Tool Co., Richmond, Ind.

Drilling Machines, Bench
Beacon Engineering Co., Tipton, England.
Can. Blower & Forge Co., Ltd., Kitchener.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Henry & Wright Mfg. Co., Hartford, Conn.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Terry & Co., John C., Birmingham, Eng.
U.S. Electrical Tool Co., Cincinnati, O.
Wisconsin Electric Co., Racine, Wis

Drilling Machines, Electric and Hand
Aikenhead Hardware Ltd., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Foss Machinery & Supply Co., Geo F., Montreal Que.
Garlock-Walker Mchy. Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.
Jardine & Co., A. B., Hespeler, Ont.
Wisconsin Electric Co., Racine, Wis

Drilling Machines, Gang
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Bilton Machine Co., Bridgeport, Conn.
Garlock-Walker Mchy. Co., Toronto, Ont.
Hoefer Mfg. Co., Freeport, Ill.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Drilling Machines, Heavy Duty
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Mchy Co., Toronto Ont
Hoosier Drilling Mach. Co., Goshen, Ind.
Rockford Lathe & Drill Co., Rockford, Ill.

Drilling Machines, Horizontal (See Boring, Drilling and Milling Machines, Horizontal)
Canada Machinery Corp., Galt, Ont
Gisholt Machine Co., Madison, Wis
Holly, R. S., Toronto, Ont.
Rockford Drilling Machine Co., Rockford, Ill.
Rockford Lathe & Drill Co., Rockford Ill.

Drilling Machines, Multiple Spindle
Beacon Engineering Co., Tipton, England.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Bilton Machine Co., Bridgeport, Conn.
Henry & Wright Mfg. Co., Hartford, Conn
Hoefer Mfg. Co., Freeport, Ill.
National Acme Co., Cleveland, Ohio.
National Automatic Tool Co., Richmond, Ind.
Terry & Co., John C., Birmingham, Eng.

Drilling Machines, Pneumatic
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Cleveland Pneumatic Tool Co., Toronto, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill

Drilling Machines, Portable
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago Ill
Jardine & Co., A. B., Hespeler, Ont.
Wisconsin Electric Co., Racine, Wis

Drilling Machines, Radial
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont
Can. Fairbanks-Morse Co., Ltd., Montreal.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont
Henry & Wright Mfg. Co., Hartford, Conn
Herbert Ltd., Alfred, Toronto, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Williams Machinery Co., A. R., Toronto, Ont
Williams Machinery & Supply Co., A. R., Montreal, Que.

Drilling Machines, Sensitive
Beacon Engineering Co., Tipton, England.
Bilton Machine Co., Bridgeport, Conn
Henry & Wright Mfg. Co., Hartford, Conn.
Herbert Ltd., Alfred, Toronto, Ont.
Hoosier Drilling Mach. Co., Goshen, Ind.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Rockford Drilling Machine Co., Rockford, Ill
Terry & Co., John C., Birmingham, Eng
United States Machine Tool Co., Cincinnati, Ohio
Williams Machinery Co., A. R., Toronto, Ont
Wisconsin Electric Co., Racine, Wis

Drilling Machines, Turret
Gisholt Machine Co., Madison, Wis
Steinle Turret Machine Co., Madison, Wis
Williams Machinery Co., A. R., Toronto, Ont

Drilling Machines, Vertical
Aurora Tool Works, Aurora, Ind.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can Blower & Forge Co., Ltd., Kitchener
Can. Fairbanks-Morse Co., Ltd., Montreal
Garlock-Walker Mchy. Co., Toronto, Ont
Herbert Ltd., Alfred, Toronto, Ont.
Hoefer Mfg. Co., Freeport, Ill
Hoosier Drilling Mach. Co., Goshen, Ind
McDougall Co., Ltd., R., Galt, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Rockford Drilling Machine Co., Rockford, Ill
Rockford Lathe & Drill Co., Rockford Ill.
Perfect Machine Co., Ltd., Galt, Ont.
Terry & Co., John C., Birmingham, Eng
Stringer Co. of Can., Ltd., Chas. A., Windsor, Ont.

Drills, Center
Butterfield & Co., Inc., Rock Island, Que
Cleveland Twist Drill Co., Cleveland, O
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Drills, High Speed Twist
Armstrong Whitworth Co. of Can., Ltd., Montreal, Que.
Butterfield & Co., Inc., Rock Island, Que
Can. Fairbanks-Morse Co., Ltd., Montreal
Cleveland Twist Drill Co., Cleveland, O
Can. Detroit Twist Drill Co., Walkerville, Ont.
Foss Machinery & Supply Co., Geo. F., Montreal, Que
Garlock-Walker Mchy. Co., Toronto, Ont.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Lyman Tube & Supply Co., Montreal, Que.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.
Pilot Steel & Tool Co., Montreal, Que
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Sheffield Engineering Supplies, Ltd., Montreal, Que.
Sheffield Twist Drill & Steel Co., Sheffield, Eng

Drills, Ratchet
Armstrong Bros. Tool Co., Chicago, Ill.
Butterfield & Co., Inc., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland, O.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.

Drills, Twist and Flat
Butterfield & Co., Inc., Rock Island, Que
Cleveland Twist Drill Co., Cleveland, O
Can. Detroit Twist Drill Co., Walkerville, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Pilot Steel & Tool Co., Montreal, Que.

Dust Handling Equipment
Can. Blower & Forge Co., Ltd., Kitchener.
Skinner Bros. Mfg. Co., Inc., St. Louis Mo.
Sturtevant Co., B. F., Boston, Mass.

Electrical Instruments
Bristol Co., Waterbury, Conn.
Northern Electric Co., Montreal, Que

Electrical Supplies
Atkins & Co., Inc., E. C., Indianapolis, I.
Diamond State Fibre Co., Toronto, Ont.
Northern Electric Co., Montreal, Que.
U.S. Electrical Tool Co., Cincinnati, O

Elevating Trucks (See Trucks)
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.

Elevators and Conveyors
Can. Link-Belt Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Jones & Glassco, Montreal, Que.
Lyman Tube & Supply Co., Montreal, Que.
Main Belting Co. of Can., Montreal, Que
Mathews Gravity Carrier Co., Port Hope, Ont.

Emery Wheels (See Grinding Wheels)
Aikenhead Hardware Ltd., Toronto, Ont.
Atkins & Co., Inc., E. C., Indianapolis, I.
Can. Hart Products, Ltd., Hamilton, Ont.
Dom Abrasive Wheel Co., Ltd., Mimico, Ont.
Ford-Smith Machine Co., Hamilton, Ont
Norton Co. of Can., Ltd., Hamilton, Ont.
Waltham Grinding Wheel Co. of Canada, Ltd., Brantford, Ont.

Engines, Capstan
Kennedy & Sons, Wm., Owen Sound, Ont

Engineers, Mechanical
Ford-Smith Machine Co., Hamilton, Ont
Gisholt Machine Co., Madison, Wis
Hamilton Gear & Machine Co., Toronto, Ont
Perdue, W. B., San Francisco, Calif

Expanders, Tube
Garlock-Walker Mchy. Co., Toronto, Ont
Holden Co., Ltd., Montreal, Que
Jardine & Co., A. B., Hespeler, Ont
Petrie, Ltd., H. W., Toronto, Ont.

Eyeglasses, Safety (See Goggles, Safety)
Prest-O-Lite Co. of Can., Toronto, Ont
Willson Goggles, Inc., Reading, Pa.

Fans, Electric
Can. Blower & Forge Co., Ltd., Kitchener
Can. Fairbanks-Morse Co., Ltd., Montreal
Northern Electric Co., Montreal, Que.
Skinner Bros. Mfg. Co., Inc., St. Louis Mo
Sturtevant Co., B. F., Boston, Mass

Fans, Exhaust
Can. Blower & Forge Co., Ltd., Kitchener
Petrie, Ltd., H. W., Toronto, Ont.
Skinner Bros. Mfg. Co., Inc., St. Louis Mo
Sturtevant Co., B. F., Boston, Mass.

Fans, Ventilating
Can. Blower & Forge Co., Ltd., Kitchener
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Petrie, Ltd., H. W., Toronto, Ont
Skinner Bros. Mfg. Co., Inc., St. Louis Mo
Sturtevant Co., B. F., Boston, Mass.

Fibre
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.
Northern Electric Co., Montreal, Que.

File Handles
Ingersoll File Co., Ltd., Ingersoll, Ont.

Files and Rasps
Atkins & Co., Inc., E. C., Indianapolis, I.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Ingersoll File Co., Ltd., Ingersoll, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Nicholson File Co., Port Hope, Ont.
Simonds Canada Saw Co., Montreal, Que.

Filing Machines
Garlock-Walker Mchy. Co., Toronto, Ont
Oliver Machinery Co., Grand Rapids, Mich.
Williams Machinery & Supply Co., A. R., Montreal Que

Filler, Iron (See Cements, Iron)
Smooth Mfg. Co., Jersey City, N.J

Fire Extinguishers
Can. Consolidated Rubber Co., Ltd Montreal, Que.

Fittings, Pipe
International Malleable Iron Co., Guelph, Ont.

Flexible Shafts
Alkenhead Hardware Ltd., Toronto, Ont

Flux, Galvanizing
Brass, Smelting & Refining Co., Ltd Montreal, Que.

Fluxes, Welding
L'Air Liquide Society, Toronto, Ont.

Forging Machinery
Acme Machinery Co., Cleveland, Ohio.
Bertram & Son Co., Ltd., The John Dundas, Ont.
Brown, Boggs & Co., Ltd., Hamilton, Ont
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Garlock-Walker Mchy. Co., Toronto, Ont
National Machine Co., Tiffin, Ohio.
Stewart & Co., Duncan, Glasgow, Scot

Forgings, Drop
Canada Foundries & Forgings Co., Welland, Ont.
Dominion Forge & Stamping Co., Ltd Toronto, Ont.

Forgings, Hammer
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Canada Foundries & Forgings Co., Welland, Ont.
Can. Atlas Crucible Steel Co., Ltd Toronto, Ont.
Dominion Bridge Co., Ltd., Lachine, Que
Dom. Foundries & Steel, Hamilton, Ont.
Hepburn Ltd., John T., Toronto, Ont.
N. S. Steel Co., Ltd., New Glasgow, N.S
Steel Co. of Canada, Ltd., Hamilton, Ont

Foundry Equipment
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Ford-Smith Machine Co., Hamilton, Ont
Holden Co., Ltd., Montreal, Que.
McDougall Co., Ltd., R., Galt, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Rice Lewis & Son, Ltd., Toronto, Ont.

Foundry Supplies
Atkins & Co., Inc., E. C., Indianapolis, I
Rice Lewis & Son, Ltd., Toronto, Ont.
Sturtevant Co., B. F., Boston, Mass.

Frogs, Spring or Rigid
Can. Steel Foundries, Montreal, Que.

Fuel Oil Burning System
General Combustion Co. of Can., Ltd., Montreal, Que.

Furnaces, Electric
Electric Furnace Construction Co., Philadelphia, Pa.
General Combustion Co. of Can., Ltd., Montreal, Que.

Furnaces, Heat Treating Coal
General Combustion Co. of Can., Ltd., Montreal, Que.
Mechanical Engineering Co., Three Rivers, Que.
Rockwell Co., W. S., New York City.

Furnaces, Heat Treating Oil and Gas
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Bellevue Industrial Furnace Co., Detroit.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal
General Combustion Co of Can., Ltd., Montreal, Que.
Mechanical Engineering Co., Three Rivers, Que.
Rockwell Co., W. S., New York City
Walker & Sons Metal Products, Ltd., Hiram Walkerville, Ont

Furnaces and Ovens, Electric
Electric Furnace Construction Co., Phildelphia, Pa.
Petrie, Ltd., H. W., Toronto, Ont.
Volta Mfg Co., Welland, Ont
Walker & Sons Metal Products, Ltd Hiram, Walkerville, Ont.

Furnaces, Tempering and Annealing
Brown & Sharpe Mfg. Co., Providence, R.I.
Electric Furnace Construction Co., Philadelphia, Pa.
Mechanical Engineering Co., Three Rivers, Que.
Rockwell Co., W. S., New York City
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Furniture, Machine Shop
Garlock-Walker Mchy. Co., Toronto, Ont

Gages, Comparator
Jones & Lamson Machine Co., Springfield, Vt.
Herbert Ltd., Alfred, Toronto, Ont.
Johansson Inc., C. E., Windsor, Ont
Perdue, W. B., San Francisco, Calif
Starrett Co., L. S., Athol, Mass

Gages, Measuring (See Tool Work)
Chesterman & Co., Ltd., J., Sheffield, Eng
Crescent Machine Co., Ltd., Montreal, Q.
Greenfield Tap & Die Corp., Galt, Ont.
Johansson Inc., C. E., Windsor, Ont
Starrett Co., L. S., Athol, Mass.

Gages, Recording
Bristol Co., Waterbury, Conn.
Johansson Inc., C. E., Windsor, Ont.

BUYERS' DIRECTORY

Gages, Snap, Thread and Cylindrical
Ackworthie, Ltd., John, Birmingham, Eng
Brown & Sharpe Mfg. Co., Providence, R I
Can. Fairbanks Morse Co., Ltd., Montreal
Greenfield Tap & Die Corp., Galt, Ont.
Johansson Inc., C. E., Windsor, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Gages, Special Measuring (See Tool Work)
Greenfield Tap & Die Corp., Galt, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Gages, Standard
Armstrong Whitworth Co. of Can., Lt Montreal, Que.
Atkins & Co., Inc., E. C., Indianapolis.
Johansson Inc., C. E., Windsor, Ont.

Gages, Thread
Ackworthie, Ltd., John, Birmingham, Eng
Greenfield Tap & Die Corp., Galt, Ont.
Johansson Inc., C. E., Windsor, Ont.
Starrett Co., L. S., Athol, Mass.

Garnet, Emery and Flint Paper and Cloth
Ritchey Supply Co., Toronto, Ont.

Gas, Coal Compressed
L'Air Liquide Society, Toronto, Ont.

Gas, Compressed
Prest-O-Lite Co. of Can., Toronto, Ont.

Gaskets
Diamond State Fibre Co of Can., Ltd., Toronto, Ont.
Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.
Goodyear Tire & Rubber Co of Can., Ltd., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Smooth Mfg. Co., Jersey City, N.J.

Gear Blanks
Canada Foundries & Forgings Co., Welland, Ont.
Can. Steel Foundries, Montreal, Que
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.
Dom. Foundries & Steel, Hamilton, Ont.
Hamilton Gear & Machine Co., Toronto Ontario
Philadelphia Gear Works, Philadelphia, Pa.

Gear-Cutting Machines
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Bilton Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Fellows Gear Shaper Co., Springfield, Vt.
Petrie, Ltd., H. W., Toronto, Ont.
Whiton Machine Co., D. E., New London, Conn.

Gear Testing Machines
Brown & Sharpe Mfg. Co., Providence, R I

Gears, Cast
Can. Link-Belt Co., Toronto, Ont.
Can. Steel Foundries, Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Fisher Motor Co., Ltd., Orillia, Ont.
Hull Iron & Steel Foundries, Hull, Que

Gears, Cut
Brown & Sharpe Mfg. Co., Providence, R I.
Canadian SKF Co., Toronto, Ont.
Crescent Machine Co., Ltd., Montreal, Q
Diamond State Fibre Co of Can., Ltd., Toronto, Ont.
Dominion Bridge Co., Ltd., Lachine, Que
Dom. Steel Products Co., Brantford, Ont.
Ford-Smith Machine Co., Hamilton, Ont
Gardner & Son, Robt., Montreal, Que.
Hamilton Gear & Machine Co., Toronto, Ontario.
Hepburn Ltd., John T., Toronto, Ont.
Jardine & Co., A. B., Hespeler, Ont.
Jones & Glassco, Montreal, Que.
Lyman Tube & Supply Co., Montreal, Que
McDougall Co., Ltd., R., Galt, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Renold (Hans) of Canada, Ltd., Montreal, Que.

Gears, Dressed
Kennedy & Sons, Wm., Owen Sound, Ont

Gears, Forged
Canada Foundries & Forgings Co., Welland, Ont.
Lyman Tube & Supply Co., Montreal, Que.

Gears, Herringbone
Dom. Steel Products Co., Brantford, Ont.
Hamilton Gear & Machine Co., Toronto, Ont.
Philadelphia Gear Works, Philadelphia, Pa.

Gears, Machine Moulded
Can. Steel Foundries, Montreal, Que.

Gears, Rawhide (See Gears, Cut)
Hamilton Gear & Machine Co., Toronto Ontario.
Philadelphia Gear Works, Philadelphia, Pa

Gear, Silent Chain
Gardner & Son, Robt., Montreal, Que
Morse Chain Co., Ithaca, N.Y.
Can. Link-Belt Co., Ltd., Toronto, Can.
Hans Renold of Canada, Ltd., Montreal, Quebec

Gears, Worm
Dom. Steel Products Co., Brantford, Ont.
Hamilton Gear & Machine Co., Toronto, Ontario.

Generators, Acetylene
L'Air Liquide Society, Toronto, Ont.

Generators, Electric
Holden Co., Ltd., Montreal, Que.
Northern Electric Co., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Sturtevant Co., B. F., Boston, Mass

Goggles, Safety
Perdue, W. B., San Francisco, Calif
Prest-O-Lite Co. of Can., Toronto, Ont
Standard Optical Co., Geneva, N.Y.
Wilson Goggles, Inc., Reading, Pa

Grab Buckets
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Ltd., Lachine, Que.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.

Grease Cups, Pressed Steel and Brass
Can Winkley Co., Ltd, Windsor, Ont.

Greases, Lubricating
Canadian SKF Co., Toronto, Ont.
Cateract Refining Co., Toronto, Ont.

Grinding Discs
Ritchey Supply Co., Toronto, Ont.

Grinding Machines
Brown & Sharpe Mfg. Co., Providence, R I.
Can. Fairbanks-Morse Co., Ltd., Montreal

Grinding Machines, Abrasive Belt
Beacon Engineering Co., Tipton, England.
Norton Co. of Can., Ltd., Hamilton, Ont.

Grinding Machines, Automatic
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont

Grinding Machines, Bench
Aikenhead Hardware Ltd., Toronto, Ont
Blount Co., J. G., Everett, Mass.
Ford-Smith Machine Co., Hamilton, Ont
Foss Machinery & Supply Co., Geo F., Montreal, Que
Geometric Tool Co., New Haven, Conn.
Holly, R. S., Toronto, Ont.
La Salle Tool Co., La Salle, Ill.
Landis Tool Co., Waynesboro, Pa
Morse Twist Drill & Machine Co., New Bedford, Mass.
McDougall Co., Ltd., R., Galt, Ont.
Norton Co. of Can., Ltd., Hamilton, Ont
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Rockford Drilling Machine Co., Rockford, Ill.
Roelefson Machine & Tool Co., Toronto, Ont.
Waltham Grinding Wheel Co. of Canada, Brantford, Ont.
Terry & Co., John C., Birmingham, Eng
Strelinger Co of Can., Ltd., Chas A., Windsor, Ont.
Wilkinson & Kompass, Hamilton, Ont
Williams Machinery & Supply Co., A. R., Montreal, Que.

Grinding Machines, Center
U S Electrical Tool Co., Cincinnati, O
Wisconsin Electric Co., Racine, Wis

Grinding Machines Chaser
Jones & Lamson Machine Co., Springfield, Vt.

Grinding Machines, Cutter and Reamer
Cincinnati Milling Machine Co., Cincinnati, Ohio.
Garlock-Walker Mchy. Co., Toronto, Ont
Greenfield Machine Co., Greenfield, Mass.
Herbert Ltd., Alfred, Toronto, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Grinding Machines, Cylindrical
Garlock-Walker Mchy. Co., Toronto, Ont
Greenfield Machine Co., Greenfield, Mass.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Grinding Machines, Die
Jones & Lamson Machine Co., Springfield, Vermont.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ont.

Grinding Machines, Disc
Beacon Engineering Co., Tipton, England
Ford-Smith Machine Co., Hamilton, Ont

Grinding Machines, Drill
Beacon Engineering Co., Tipton, England.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Holden Co., Ltd., Montreal, Que

Grinding Machines, Face
Ford-Smith Machine Co., Hamilton, Ont

Grinding Machines, Floor and Tool
Beacon Engineering Co., Tipton, England.
Blount Co., J. G., Everett, Mass.
Ford-Smith Machine Co., Hamilton, Ont
Gisholt Machine Co., Madison, Wis.
Modern Tool Co., Erie, Pa.
National Acme Co., Cleveland, Ohio.
Petrie, Ltd., H. W., Toronto, Ont.
Terry & Co., John C., Birmingham, Eng

Grinding Machines, Internal
Garlock-Walker Mchy. Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.

Grinding Machines, Portable
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Pneumatic Tool Co., Toronto, Ont.
Garlock-Walker Mchy. Co., Toronto Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill
Wisconsin Electric Co., Racine, Wis.

Grinding Machines, Power Oscillating Tool
Herbert Ltd., Alfred, Toronto, Ont

Grinding Machines, Ring Wheel
Ford-Smith Machine Co., Hamilton, Ont

Grinding Machines, Snagging
Blount Co., J. G., Everett, Mass.
Norton Co. of Can., Ltd., Hamilton, Ont

Grinding Machines, Surface
Garlock-Walker Mchy. Co., Toronto Ont
La Salle Tool Co., Ltd., La Salle, Ill.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Grinding Machines, Thread
Pratt & Whitney Co., of Canada Ltd Dundas, Ont.

Grinding Machinery, Tool Post
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Gisholt Machine Co., Madison, Wis
Wisconsin Electric Co., Racine, Wis

Grinding Machines, Universal
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont
Gisholt Machine Co., Madison, Wis
La Salle Tool Co., Ltd., La Salle, Ill.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford, Mass.
Petrie, Ltd., H. W., Toronto, Ont
Roelefson Machine & Tool Co., Toronto, Ont.
Waltham Grinding Wheel Co. of Canada, Brantford, Ont.

Grinding Wheels
Aikenhead Hardware Ltd., Toronto, Ont
Atkins & Co., Inc., E. C., Indianapolis, I.
Can. Fairbanks-Morse Co., Ltd., Montreal
Dom. Abrasive Wheel Co., Ltd., Mimico, Ont.
Ford-Smith Machine Co., Hamilton, Ont
Norton Co. of Can., Ltd., Hamilton, Ont.
Waltham Grinding Wheel Co. of Canada Ltd., Brantford, Ont.

Guards, Machinery and Window
Can Wire & Iron Goods Co., Hamilton, Ont.

Guards, Electric Lamp
Flexible Steel Lacing Co., Chicago, Ill

Gun-Barrel Machinery
Steinle Turret Machine Co., Madison, Wis

Hack Saws, Power
Ackworthie, Ltd., John, Birmingham, Eng
Aikenhead Hardware Ltd., Toronto, Ont.
Atkins & Co., Inc., E. C., Indianapolis, I
Clemson Bros., Hamilton, Canada
Garlock-Walker Mchy Co., Toronto, Ont
Lyman Tube & Supply Co., Montreal, Que
Petrie, Ltd., H. W., Toronto, Ont.
Simonds Canada Saw Co., Montreal, Que
Starrett Co., L. S., Athol, Mass
Williams Machinery & Supply Co., A. R., Montreal, Que.

Hammers, Chipping
Cleveland Pneumatic Tool Co Toronto Ont.

Hammers, Drop
Bertram & Son Co., Ltd., The John Dundas, Ont.
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Canada Foundries & Forgings Co., Welland, Ont.
Canada Machinery Corp., Galt, Ont

Hammers, Electric
Aikenhead Hardware Ltd., Toronto, Ont
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Holden Co., Ltd., Montreal, Que

Hammers, Pneumatic
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Cleveland Pneumatic Tool Co., Toronto, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.
Keller Pneumatic Tool Co., Grand Haven, Mich

Hammers, Power
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Brown, Boggs & Co., Ltd., Hamilton, Ont
Jardine & Co., A. B., Hespeler, Ont.
Petrie, Ltd., H. W., Toronto, Ont.

Hammers, Riveting
Cleveland Pneumatic Tool Co., Toronto Ont.

Hangers, Shafting
Can. Link-Belt Co., Toronto, Ont.
Canadian SKF Co., Toronto, Ont.
Chapman Double Ball Bearing Co., Toronto, Ont.
Ford-Smith Machine Co., Hamilton, Ont
Foss Machinery & Supply Co., Geo F Montreal, Que.
Terry & Co., John C., Birmingham, Eng
Williams Machinery & Supply Co., A R Montreal, Que.

Hardening, Case-Hardening and Tempering
Hamilton Gear & Machine Co., Toronto Ont.

Hardness Testing Apparatus
Shore Instrument Co., Jamaica, N.Y.

Heating
Skinner Bros Mfg Co, Inc, St. Louis Mo

Hobbing Machines
Herbert Ltd., Alfred, Toronto, Ont.
Petrie, Ltd., H. W., Toronto, Ont.

Hobs
Armstrong-Whitworth of Canada, Ltd Montreal, Canada.
Brown & Sharpe Mfg. Co., Providence, R I
Greenfield Tap & Die Corp., Galt, Ont
Pratt & Whitney Co., of Canada, Ltd Dundas, Ont.

Hoists, Electric
Can. Ingersoll-Rand Co., Ltd., Sherbrooke Que.
Can. Link-Belt Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Garlock-Walker Mchy. Co., Toronto, Ont
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont
Shepard Electric Crane & Hoist Co. Montour Falls, N.Y.
Volta Mfg. Co., Welland, Ont.

Hoists, Hand
Lyman Tube & Supply Co., Montreal, Que
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio.

Hoists, Pneumatic
Can. Ingersoll-Rand Co., Ltd., Sherbrooke Que.
Curtis Pneumatic Machinery Co., St Louis, Mo
Garlock-Walker Mchy. Co., Toronto, Ont
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont

Holders-On, Pneumatic
Can. Ingersoll-Rand Co., Ltd., Sherbrooke Que.
Cleveland Pneumatic Tool Co., Toronto Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.

Hose, Flexible Steel
Can. Fairbanks-Morse Co., Ltd., Montreal
Ontario Metal Products Co., Ltd., Toronto, Ont.

Hose, Industrial
Dunlop Tire & Rubber Goods Co., Ltd Toronto, Ont.
Goodyear Tire & Rubber Co of Can Ltd., Toronto, Ont.

Hose, Rubber
Can. Consolidated Rubber Co., Ltd. Montreal, Que.
Can. Foamite Firefoam Co., Hamilton Ont.

Hydraulic Leather
Graton & Knight Mfg. Co., Worcester Mass.

Hydraulic Machinery
Bertram & Son Co., Ltd., The John Dundas, Ont.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke Que.
Garlock-Walker Mchy. Co., Toronto, Ont
Stewart & Co., Duncan, Glasgow, Scot

Hydrogen
National Electro Products, Ltd., Toronto Ont.

Index Centers
Dickow, Fred. C., Machinery Co., Chicago, Ill.

Igniters, Gas Engine
Canada Foundries & Forgings Co., Welland, Ont.

Indicators, Speed and Test
Aikenhead Hardware Ltd., Toronto, Ont
Atkins & Co., Inc., E. C., Indianapolis, I
Brown & Sharpe Mfg. Co., Providence, R I

Insulation
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.

Jacks, Hydraulic
Norton, A. O., Boston, Mass.

Jacks, Planer
Armstrong Bros. Tool Co., Chicago, Ill
Starrett Co., L. S., Athol, Mass.

Bilton Machine Co., Bridgeport, Conn.
Burgess & Marchand, Montreal, Que
Crescent Machine Co., Ltd., Montreal, Q.

BUYERS' DIRECTORY

Jigs and Fixtures (See Tool Work)
Fisher Motor Co., Ltd., Orillia, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Gisholt Machine Co., Madison, Wis.
Hamilton Engineering Service, Ltd., Hamilton, Ont.
Rapid Tool & Machine Co., Lachine, Que

Keyseating Machines
Bilton Machine Co., Bridgeport, Conn.
Garlock-Walker Mchy. Co., Toronto, Ont.
Morton Mfg. Co., Muskegon, Mich.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Keys, Machine
Can. Drawn Steel Co., Hamilton, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont
Morton Mfg. Co., Muskegon, Mich.

Knives, Machine
Atkins & Co., Inc., E. C., Indianapolis, I.
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.
Simonds Canada Saw Co., Montreal, Que.

Knurl Holders
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Lacing Leather
Clipper Belt Lacer Co., Grand Rapids, Mich.
Main Belting Co. of Can., Montreal, Que.

Lamps, Electric
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
Northern Electric Co., Montreal, Que.

Lathe Attachments
Canada Machinery Corp., Galt, Ont.
Hendey Machine Co., Torrington, Conn.
Lehmann Machine Co., St. Louis, Mo.
Petrie, Ltd., H. W., Toronto, Ort.

Lathe Pans, Portable
Canada Machinery Corp., Galt, Ont.

Lathe Tools
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hendey Machine Co., Torrington, Conn.

Lathes, Automatic and Semi-Automatic
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Gisholt Machine Co., Madison, Wis.
Herbert Ltd., Alfred, Toronto, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
McDougall Co., Ltd., R., Galt, Ont.
National Acme Co., Cleveland, Ohio.
Steinle Turret Machine Co., Madison, Wis.

Lathes, Bench
Archibald & Co., Chas. P., Montreal, Q.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Lathes, Boring
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Steinle Turret Machine Co., Madison, Wis.

Lathes, Chucking (See Lathes, Horizontal Turret, and Lathes, Vertical Turret)
Acme Machine Tool Co., Cincinnati, Ohio.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vermont.
McDougall Co., Ltd., R., Galt, Ont.
Steinle Turret Machine Co., Madison, Wis
Warner & Swasey Co., Cleveland, Ohio.

Lathes, Engine
Archibald & Co., Chas. P., Montreal, Q
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Herbert Ltd., Alfred, Toronto, Ont.
Hendey Machine Co., Torrington, Conn
Holly, R. S., Toronto, Ont.
Lehmann Machine Co., St. Louis, Mo.
McDougall Co., Ltd., R., Galt, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Petrie, Ltd., H. W., Toronto, Ont.
Rockford Lathe & Drill Co., Rockford, Ill
Roelefson Machine & Tool Co., Toronto, Ont.
Sidney Machine Tool Co., Sidney, Ohio.
Strelinger Co. of Can., Ltd., Chas. A., Windsor, Ont.
Walcott Lathe Co., Jackson, Mich.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Lathes, Extension and Gap
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis.
McDougall Co., Ltd., R., Galt, Ont.
Oliver Machinery Co., Grand Rapids, Mich.

Lathes, Heavy Duty Projectile Boring
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Blashill Wire Machy. Co., Ltd., Montreal.
Sidney Machine Tool Co., Sidney, Ohio.
Steinle Turret Machine Co., Madison, Wis.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Lathes, Horizontal Turret
Acme Machine Tool Co., Cincinnati, Ohio
Blount Co., J. G., Everett, Mass.
Gisholt Machine Co., Madison, Wis
Herbert Ltd., Alfred, Toronto, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
McDougall Co., Ltd., R., Galt, Ont.
National Acme Co., Cleveland, Ohio.
Oliver Machinery Co., Grand Rapids, Mich.
Petrie, Ltd., H. W., Toronto, Ont.
Rockford Lathe & Drill Co., Rockford, Ill.
Steinle Turret Machine Co., Madison, Wis.
Warner & Swasey Co., Cleveland, Ohio

Lathes, Polishing (See Polishing and Buffing Machines)
Ford-Smith Machine Co., Hamilton, Ont

Lathes, Relieving
Canada Machinery Corp., Galt, Ont.
Hendey Machine Co., Torrington, Conn.
McDougall Co., Ltd., R., Galt, Ont.

Lathe, Universal Hand
Brown & Sharpe Mfg. Co., Providence, R I

Lathes, Screw-Cutting
Jones & Lamson Machine Co., Springfield, Vt.

Lathe, Speed and Hand
Blount Co., J. G., Everett, Mass.
Garlock-Walker Mchy. Co., Toronto, Ont.
Greenfield Tap & Die Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich

Lathes, Spinning
Terry & Co., John C., Birmingham, Eng.

Lathes, Threading
Canada Machinery Corp., Galt, Ont.
Greenfield Tap & Die Corp., Galt, Ont.
Hendey Machine Co., Torrington, Conn
Lehmann Machine Co., St. Louis, Mo

Lathes, Vertical Turret
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vermont.
Roelefson Machine & Tool Co., Toronto, Ont.

Lathes, Wood Turning
Blount Co., J. G., Everett, Mass.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy. Co., Toronto, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Petrie, Ltd., H. W., Toronto, Ont.

Lead Pipe
Steel Co. of Canada, Ltd., Hamilton, Ont.

Lighting Fixtures
Northern Electric Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.

Linoleum Mill Machinery
Bertrams Ltd., Edinburgh, Scotland.

Liquid Air Plants
L'Air Liquide Society, Toronto, Ont.

Lockers, Clothes
Can. Foamite Firefoam Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ont.

Lubricants
Cateract Refining Co., Toronto, Ont.
Oakley Chemical Co., New York, N.Y.

Lubricating Systems
Bowser, S. F., & Co., Ltd., Toronto, Can.

Machinists' Small Tools
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Bertrams Ltd., Edinburgh, Scotland.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Canada Foundries & Forgings Co., Welland, Ont.
Can. Fairbanks-Morse Ltd., Montreal. Q
Dodge Mfg. Co. of Can., Toronto, Ont
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Ker & Goodwin Machine Co., Brantford, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Rapid Tool & Machine Co., Lachine, Que.
Rice Lewis & Son, Ltd., Toronto, Ont.
Rockford Milling Machine Co., Rockford, Ill.
Starrett Co., L. S., Athol, Mass.
Strelinger Co. of Can., Ltd., Chas. A., Windsor, Ont.
Wheel Trueing Tool Co., Detroit, Mich.
Williams Machinery Co., A. R., Toronto, Ont.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Manganese Steel
Can. Steel Foundries, Montreal, Que

Mandrels, Expanding
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Mandrels, Solid
Atkins & Co., Inc., E. C., Indianapolis, I
Cleveland Twist Drill Co., Cleveland, O
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Measuring Machines
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Metals, Alloy
British Smelting & Refining Co., Ltd. Montreal, Que.
Brown's Copper & Brass Rolling Mills, Ltd., Toronto, Ont.
Canada Metal Co., Ltd., Toronto, Ont.
Can. Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Can. Steel Foundries, Montreal, Que.
Deloro Smelting & Refining Co., Ltd., Toronto, Ont.
Fisher Motor Co., Ltd., Orillia, Ont.
Hoyt Metal Co., Toronto, Ont.
International Nickel Co. of Can., Ltd., Toronto, Ont.
Magnolia Metal Co., Montreal, Que.
Moore & Son, Thos., Montreal, Que.
Pilot Steel & Tool Co., Montreal, Que.
Tallman Brass & Metal, Ltd., Hamilton, Ontario.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Metalite Cloth
Ritchey Supply Co., Toronto, Ont.

Micrometer Calipers
Aikenhead Hardware Ltd., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Rice Lewis & Son, Ltd., Toronto, Ont.

Milling Attachments
Ackworthie, Ltd., John, Birmingham, Eng.
Cincinnati Milling Machine Co., Cincinnati, Ohio.
Ford-Smith Machine Co., Hamilton, Ont
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis
Kempsmith Mfg. Co., Milwaukee, Wis.
Petrie, Ltd., H. W., Toronto, Ont.

Milling Machines
Brown & Sharpe Mfg. Co., Providence, R.I
Can. Fairbanks-Morse Co., Ltd., Montreal.

Milling Machines, Automatic
Bilton Machine Co., Bridgeport, Conn.
Cincinnati Milling Machine Co., Cincinnati, Ohio.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Terry & Co., John C., Birmingham, Eng.

Milling Machines, Bench
Burke Machine Tool Co., Conneaut, Ohio
Garlock-Walker Mchy. Co., Toronto, Ont.
Rockford Milling Machine Co., Rockford, Ill.
Terry & Co., John C., Birmingham, Eng.

Milling Machines, Hand
Burke Machine Tool Co., Conneaut, Ohio
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Rockford Milling Machine Co., Rockford, Ill.
Terry & Co., John C., Birmingham, Eng.
United States Machine Tool Co., Cincinnati, Ohio.

Milling Machines, Horizontal and Planer Type
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Can. Fairbanks-Morse Ltd., Montreal. Q
Cleveland Milling Machine Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont
Gooley Edlund Inc., Cortland, N.Y.
Herbert Ltd., Alfred, Toronto, Ont.
Kearney & Trecker Co., Milwaukee, Wis
Rockford Milling Machine Co., Rockford, Ill.
Roelefson Machine & Tool Co., Toronto, Ont.
Williams Machinery Co., A. R., Toronto, Ont.

Milling Machines, Plain
Bilton Machine Co., Bridgeport, Conn.
Cincinnati Milling Machine Co., Cincinnati, Ohio.
Cleveland Milling Machine Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont
Gooley Edlund Inc., Cortland, N.Y.
Hendey Machine Co., Torrington, Conn.
Herbert Ltd., Alfred, Toronto, Ont.
Kearney & Trecker Co., Milwaukee, Wis
Kempsmith Mfg. Co., Milwaukee, Wis.
Petrie, Ltd., H. W., Toronto, Ont.
Rockford Milling Machine Co., Rockford, Ill.
Terry & Co., John C., Birmingham, Eng.

Milling Machines, Thread
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Milling Machines, Universal
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Cincinnati Milling Machine Co., Cincinnati, Ohio.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Hendey Machine Co., Torrington, Conn
Holly, R. S., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
Kearney & Trecker Co., Milwaukee, Wis
Kempsmith Mfg. Co., Milwaukee, Wis.
Petrie, Ltd., H. W., Toronto, Ont.
Rockford Milling Machine Co., Rockford Ill.
Roelefson Machine & Tool Co., Toronto, Ont.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Milling Machines, Vertical
Cincinnati Milling Machine Co., Cincinnati, Ohio.
Garlock-Walker Mchy. Co., Toronto, Ont
Herbert Ltd., Alfred, Toronto, Ont.
Kearney & Trecker Co., Milwaukee, Wis
Kempsmith Mfg. Co., Milwaukee, Wis
Rockford Milling Machine Co., Rockford Ill.
Williams Machinery Co., A. R., Toronto, Ont.

Monel Metal
International Nickel Co. of Can., Ltd., Toronto, Ont.

Motors, Electric
Atkins & Co., Inc., E. C., Indianapolis, I.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy. Co., Toronto, Ont.
MacGovern & Co., Montreal, Que.
Northern Electric Co., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Sturtevant Co., B. F., Boston, Mass.
Williams Machinery Co., A. R., Toronto, Ont.
Wisconsin Electric Co., Racine, Wis

Moulded Rubber Goods
Can. Consolidated Rubber Co., Ltd., Montreal, Que.

Nail Machinery
Sleeper & Hartley, Inc., Worcester, Mass

Nails and Staples
Steel Co. of Canada, Ltd., Hamilton, Ont

Nickel, Bars, Sheets, Wire, Etc.
International Nickel Co. of Can., Ltd., Toronto, Ont.

Nickel Plating Outfits
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Nickel Silver
Brown's Copper & Brass Rolling Mills, Ltd., Toronto, Ont.

Nitrogen
L'Air Liquide Society, Toronto, Ont

Nut Tappers (See Bolt and Nut Machinery)
Acme Machinery Co., Cleveland, Ohio.
Bertram & Son Co., Ltd., The John, Dundas, Ont
Can. Fairbanks-Morse Co., Ltd., Montreal
Greenfield Tap & Die Corp., Galt, Ont
National Acme Co., Cleveland, Ohio.

Nuts, Finished and Semi-finished
Galt Machine Screw Co., Galt, Ont.

Nuts, Machine Screw
Torrington Company, Ltd., Upper Bedford, Que.

Nuts, S.A.E., Plain and Castellated
Galt Machine Screw Co., Galt, Ont.

Oil Filtering and Storage Systems
Bowser, S. F., & Co., Ltd., Toronto, Can.

Oil Storage Engineers
Bowser, S. F., & Co., Ltd., Toronto, Can.

Oils
Canadian Oil Companies, Ltd., Toronto, Ont.
Cateract Refining Co., Toronto, Ont
Imperial Oil Ltd., Toronto, Ont.

Oil Hole Covers
Can. Winkley Co., Ltd., Windsor, Ont

Oils, Soluble
Cateract Refining Co., Toronto, Ont.
Imperial Oil Ltd., Toronto, Ont.

Oxygen
Carter Welding Co., Toronto, Ont.
Dominion Oxygen Co., Toronto, Ont.
L'Air Liquide Society, Toronto, Ont.

Oxy-Acetylene Apparatus
L'Air Liquide Society, Toronto, Ont.

Packing, Hydraulic
Can. Consolidated Rubber Co., Ltd., Montreal, Que
Graton & Knight Mfg. Co., Worcester Mass.
Guildford & Sons, Ltd., Halifax, N.S.

Packing, Steam
Can. Consolidated Rubber Co., Ltd., Montreal, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal
Graton & Knight Mfg Co., Worcester Mass.
Guildford & Sons, Ltd., Halifax, N.S.

Paper Mill Conveyors
Bertrams Ltd., Edinburgh, Scotland.

Patents
Fetherstonhaugh & Co., Ottawa, Ont.
Marion & Marion, Montreal, Que.

Pans, Wet and Dry
Frost Mfg. Co., Chicago, Ill

Pattern-Shop Machinery (See Woodworking Machinery)
Canada Machinery Corp., Galt, Ont.
Oliver Machinery Co., Grand Rapids, Mich

Patterns, Wood and Metal
Crescent Machine Co., Ltd., Montreal, Q
Victoria Foundry Co., Ltd., Ottawa, Ont
Wraggis Pattern Works, Galt, Ont.

Penstocks, Steel
MacKinnon Steel Co., Sherbrooke, Que

BUYERS' DIRECTORY

Phosphor Tin
British Smelting & Refining Co., Ltd., Montreal, Que

Photographic Duplicating Machines
Commercial Camera Co., Providence, R I

Pig Iron
Steel Co. of Canada, Ltd., Hamilton, Ont

Pipe Bending Machines
American Pipe Bending Machine Co., Boston, Mass
Can. Fairbanks-Morse Co., Ltd., Montreal
Underwood Corp., H. B., Philadelphia, Pa
Williams Machinery Co., A. R., Toronto, Ont.

Pipe Couplings
Steel Co. of Canada, Ltd., Hamilton, Ont.

Pipe Cutting and Threading Machines
Can. Fairbanks-Morse Co., Ltd., Montreal
Crane Ltd., Montreal, Que.
Greenfield Tap & Die Corp., Galt, Ont
Jardine & Co., A. B., Hespeler, Ont.
Landis Machine Co., Inc., Waynesboro, Pa
Murchey Machine & Tool Co., Detroit, Mich.
McDougall Co., Ltd., R., Galt, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Williams Tool Corp. of Can., Ltd., Brantford, Ont.

Pipe and Nipple Threading Machines
Landis Machine Co., Inc., Waynesboro, Pa

Pipe Fitters' Tools
Aikenhead Hardware Ltd., Toronto, Ont.
Crane Ltd., Montreal, Que.
Rice Lewis & Son, Ltd., Toronto, Ont.

Pipe Threading Die Heads
Landis Machine Co., Inc., Waynesboro, Pa

Piston-Ring Machines
National Acme Co., Cleveland, Ohio.
Steinle Turret Machine Co., Madison, Wis.

Planers, Parallels
L. & P. Mfg. Co., Niagara Falls, Ont.

Planing Machines
Bertram & Son Co., Ltd., The John, Dundas, Ont
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks Morse Co., Ltd., Montreal
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont.
Hepburn Ltd., John T., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
L. & P. Mfg. Co., Niagara Falls, Ont
Morton Mfg. Co., Muskegon, Mich.
Oliver Machinery Co., Grand Rapids, Mich
Williams Machinery Co., A. R., Toronto, Ont.

Planing Machines, Rotary
Bertram & Son Co., Ltd., The John, Dundas, Ont
Canada Machinery Corp., Galt, Ont.

Plate Rolls
Bertram & Son Co., Ltd., The John, Dundas, Ont.

Pneumatic Tools
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que
Cleveland Pneumatic Tool Co., Toronto, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill
Keller Pneumatic Tool Co., Grand Haven, Mich

Polishing and Buffing Machines
Ackworthie, Ltd., John, Birmingham, Eng
Archibald & Co., Chas. P., Montreal, Q
Blount Co., J. G., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Hanson & Van Winkle Co., Ltd., Toronto, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Terry & Co., John C., Birmingham, Eng

Pots, Steel
Swedish Crucible Steel Co. of Canada, Ltd., Windsor, Ont.

Pressed Steel Parts
Ackworthie, Ltd., John, Birmingham, Eng
American Pulley Co., Philadelphia, Pa.
Fisher Motor Co., Ltd., Orillia, Ont.

Presses, Arbor
Atlas Press Co., Kalamazoo, Mich.
Can. Fairbanks-Morse Co., Ltd., Montreal
L. & P. Manufacturing Company Ltd Niagara Falls, Ont.
National Engineering Co., Sarnia, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Strellinger Co. of Can., Ltd., Chas. A., Windsor, Ont.

Presses, Drop and Forging
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Canada Foundries & Forgings Co., Welland, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Toledo Machine & Tool Co., Toledo, Ohio

Presses, Foot and Hand
Brown, Boggs & Co., Ltd., Hamilton, Ont
Terry & Co., John C., Birmingham, Eng

Presses, Forcing
Atlas Press Co., Kalamazoo, Mich.
Stewart & Co., Duncan, Glasgow, Scot.

Presses, Hydraulic
Baird Machine Co., Bridgeport, Conn.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Laurie Mfg. Co., Springfield, Ill.
Perrin Ltd., W. R., Toronto, Ont.
Stewart & Co., Duncan, Glasgow, Scot
Williams Machinery Co., A. R., Toronto, Ont.

Presses, Power
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Ltd., Hamilton, Ont
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Hepburn Ltd., John T., Toronto, Ont.
Henry & Wright Mfg Co., Hartford, Conn
Petrie, Ltd., H. W., Toronto, Ont.
Stall Co., Inc., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, Ohio

Presses, Screw
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Petrie, Ltd., H. W., Toronto, Ont.

Profiling Machines
Aikenhead Hardware Ltd., Toronto, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Protractors
Brown & Sharpe Mfg. Co., Providence, R I.

Propellers
Kennedy & Sons, Wm., Owen Sound, Ont

Pulleys, Cork Insert
American Pulley Co., Philadelphia, Pa
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Positive Clutch & Pulley Works, Toronto, Ont.

Pulleys, Metal and Fibre
American Pulley Co., Philadelphia, Pa.
Bernard Industrial Co., A., Fortierville, Que.
Can. Fairbanks-Morse Ltd., Montreal, Q.
Canadian SKF Co., Toronto, Ont.
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.
Johnson Machine Co., Carlyle, Manchester, Conn.
Kennedy & Sons, Wm., Owen Sound, Ont.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Pulp and Paper Mill Equipment
MacKinnon Steel Co., Sherbrooke, Que

Pumps, Automobile Tire
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Pumps, Barrel and Boiler-feed
Trahern Pump Co., Rockford, Ill

Pumps, Circulating and Coalant
Trahern Pump Co., Rockford, Ill

Pumps, Geared and Hand
Trahern Pump Co., Rockford, Ill

Pumps, Industrial
Trahern Pump Co., Rockford, Ill.

Pumps, Hydraulic
Can. Fairbanks-Morse Co., Ltd., Montreal.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Electric Steel & Engineering Co., Welland, Ont.
Hepburn Ltd., John T., Toronto, Ont
Holden Co., Ltd., Montreal, Que.
Stewart & Co., Duncan, Glasgow, Scot
Trahern Pump Co., Rockford, Ill.

Pumps, Lubricant and Oil
Bowser, S. F., & Co., Ltd., Toronto, Can.
Can. Blower & Forge Co., Ltd., Kitchener.
Hepburn Ltd., John T., Toronto, Ont.
McDougall Co., Ltd., R., Galt, Ont.
Trahern Pump Co., Rockford, Ill.

Pumps, Power
Bowser, S. F., & Co., Ltd., Toronto, Can.
Can. Blower & Forge Co., Ltd., Kitchener.
Can. Fairbanks-Morse Ltd., Montreal, Q.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Hepburn Ltd., John T., Toronto, Ont.
Trahern Pump Co., Rockford, Ill.

Punches, Center
Brown & Sharpe Mfg Co., Providence, R I.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Starrett Co., L. S., Athol, Mass

Punches, Hand
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Can. Blower & Forge Co., Ltd., Kitchener.
Jardine & Co., A. B., Hespeler, Ont.

Punches, Power
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Blower & Forge Co., Ltd., Kitchener.
Garlock-Walker Mchy. Co., Toronto, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Toledo Machine & Tool Co., Toledo, Ohio

Punching Machines, Horizontal
Bertrams Ltd., Edinburgh, Scotland.

Pyrometers, Electric
Bristol Co., Waterbury, Conn.
General Combustion Co. of Can., Ltd., Montreal, Que.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Racks, Cut
Ford-Smith Machine Co., Hamilton, Ont.
Hamilton Gear & Machine Co., Toronto, Ont.

Racks, Storage (See Furniture, Machine Shop)
Brantford Oven & Rack Co., Brantford, Ont.

Rammers, Foundry
Holden Co., Ltd., Montreal, Que.

Reamer Holders
Cleveland Twist Drill Co., Cleveland, O
Gisholt Machine Co., Madison, Wis.
Victor Tool Co., Waynesboro, Pa.

Reamers, Expanding
Aikenhead Hardware Ltd., Toronto, Ont.
Can. Detroit Twist Drill Co., Walkerville, Ont.
Cleveland Twist Drill Co., Cleveland, O
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Galt, Ont.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
McCroskey Tool Corp., Meadville, Pa.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Reamers, Solid
Armstrong Whitworth Co. of Can., Ltd., Montreal, Que.
Butterfield & Co., Inc., Rock Island, Que.
Can. Detroit Twist Drill Co., Walkerville, Ont.
Cleveland Twist Drill Co., Cleveland, O
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Greenfield Tap & Die Corp., Galt, Ont.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.

Reamers, Taper
Butterfield & Co., Inc., Rock Island, Que.
Can. Detroit Twist Drill Co., Walkerville, Ont.
Cleveland Twist Drill Co., Cleveland, O.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Galt, Ont.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Pilot Steel & Tool Co., Montreal, Que
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Recorders, Temperature
Taylor Instrument Co., Rochester, N.Y.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Recorders, Time
Gisholt Machine Co., Madison, Wis.
International Business Machines Co., Toronto, Ont.

Regulators, Automatic (for electric furnaces)
Volta Mfg. Co., Welland, Ont.

Rheostats
Northern Electric Co., Montreal, Que.

Resistance Materials
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Respirators
Willson Goggles, Inc., Reading, Pa.

Rivets
Parmenter & Bulloch Co., Gananoque, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Torrington Company, Ltd., Upper Bedford, Que

Rivet Heaters
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
General Combustion Co. of Can., Ltd., Montreal, Que.
Volta Mfg. Co., Welland, Ont

Rivet-Making Machinery
Acme Machinery Co., Cleveland, Ohio
Bertram & Son Co., Ltd., The John, Dundas, Ont.
National Machinery Co., Tiffin, Ohio.

Riveting Machines
Bilton Machine Co., Bridgeport, Conn.
Can. Fairbanks-Morse Co., Ltd., Montreal
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
High Speed Hammer Co., Rochester, N.Y
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.
Keller Pneumatic Tool Co., Grand Haven, Mich
Parmenter & Bulloch Co., Gananoque, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Schuster Co., F. B., New Haven, Conn.

Rolling Mill Equipment
Stewart & Co., Duncan, Glasgow, Scot.

Rolls (Rubber Covered)
Can. Consolidated Rubber Co., Ltd., Montreal, Que.

Rudder Frames, Steel
Can. Steel Foundries, Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

Rubber Goods, Mechanical
Quaker City Rubber Co., Philadelphia, Pa

Rules, Steel
Chesterman & Co., Ltd., J., Sheffield, Eng

Rules, Steel and Wood
Brown & Sharpe Mfg. Co., Providence, R I

Rust Preventatives
Oakley Chemical Co., New York, N.Y.

Sand Equipment
Can. Link-Belt Co., Toronto, Ont

Sand Mills
Frost Mfg. Co., Chicago, Ill.

Sanding Machinery
Oliver Machy. Co., Grand Rapids, Mich

Sand Rammers, Pneumatic
Can. Ingersoll-Rand Co., Ltd., Sherbrooke Que.
Cleveland Pneumatic Tool Co., Toronto Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill
Keller Pneumatic Tool Co., Grand Haven Mich

Saw Frames and Blades, Hack
Aikenhead Hardware Ltd., Toronto, Ont
Atkins & Co., Inc., E. C., Indianapolis, I
Clemson Bros., Inc., Hamilton, Ont.
Diamond Saw & Stamping Works, Buffalo, N.Y.
Foss Machinery & Supply Co., Geo. F. Montreal, Que.
Rice Lewis & Son, Ltd., Toronto, Ont.
Simonds Canada Saw Co., Montreal, Que

Sawing Machines, Metal
Atkins & Co., Inc., E. C., Indianapolis, I.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Herbert Ltd., Alfred, Toronto, Ont.
Lyman Tube & Supply Co., Montreal, Que

Sawing Machines, Power Hack
Ackworthie, Ltd., John, Birmingham, Eng
Atkins & Co., Inc., E. C., Indianapolis, I
Can. Fairbanks-Morse Co., Ltd., Montreal
Williams Machinery & Supply Co., A. R., Montreal, Que.

Saw Sharpening Machines
Atkins & Co., Inc., E. C., Indianapolis, I
Oliver Machinery Co., Grand Rapids, Mich

Saw Tables, Universal
Atkins & Co., Inc., E. C., Indianapolis, I
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont
Oliver Machinery Co., Grand Rapids, Mich
Petrie, Ltd., H. W., Toronto, Ont.

Saws, Circular Metal
Atkins & Co., Inc., E. C., Indianapolis, I
Simonds Canada Saw Co., Montreal, Que
Tabor Mfg. Co., Philadelphia, Pa.

Saws, Hand
Aikenhead Hardware Ltd., Toronto, Ont.
Atkins & Co., Inc., E. C., Indianapolis, I
Simonds Canada Saw Co., Montreal, Que

Saws, Hot and Cold
Atkins & Co., Inc., E. C., Indianapolis, I
Simonds Canada Saw Co., Montreal, Que
Stewart & Co., Duncan, Glasgow, Scot

Saws, High Speed Steel
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Atkins & Co., Inc., E. C., Indianapolis, I
Butterfield & Co., Inc., Rock Island, Que
Clemson Bros., Hamilton, Canada.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Simonds Canada Saw Co., Montreal, Que

Saws, Metal Band
Atkins & Co., Inc., E. C., Indianapolis, I
Oliver Machinery Co., Grand Rapids, Mich.

Saws, Metal, Power
Clemson Bros., Inc., Hamilton, Ont.

Saws, Metal Cutting
Atkins & Co., Inc., E. C., Indianapolis, I
Brown & Sharpe Mfg. Co., Providence, R.I
Butterfield & Co., Inc., Rock Island, Que
Clemson Bros., Inc., Hamilton, Ont.
Lyman Tube & Supply Co., Montreal, Que
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Simonds Canada Saw Co., Montreal, Que
Starrett Co., L. S., Athol, Mass.

Saws, Milling
Atkins & Co., Inc., E. C., Indianapolis, I
Butterfield & Co., Inc., Rock Island, Que
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Saws, Screw Slotting
Atkins & Co., Inc., E. C., Indianapolis, I
Butterfield & Co., Inc., Rock Island, Que
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Simonds Canada Saw Co., Montreal, Que

Saws, Swing Cut-off
Oliver Machinery Co., Grand Rapids, Mich

Scales
Brown & Sharpe Mfg. Co., Providence, R.I
Can. Fairbanks-Morse Ltd., Montreal, Q

Screens
Can. Wire & Iron Goods Co., Hamilton, Ont.

Screw Drivers, Optical, Jewelry and Novelty
Torrington Co., Ltd., Upper Bedford, Que

Screw Driving Machine
Canada Machinery Corp., Galt, Ont.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill

Screw Extractors
Cleveland Twist Drill Co., Cleveland, O

Screw Machine Work
Barnes Co., Wallace, Bristol, Conn.
Cook Co., Asa S., Hartford, Conn.
National Acme Co., Cleveland, Ohio.
Tallman Brass & Metal Co., Hamilton, Ont.

BUYERS' DIRECTORY

Screw Machinery, Wood and Lag
Cook Co., Asa S., Hartford, Conn.

Screw Machines
Brown & Sharpe Mfg Co., Providence, R I.

Screw Machines, Automatic
Garlock-Walker Mchy. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
National Acme Co., Cleveland, Ohio.

Screw Machines, Plain or Hand
Acme Machine Tool Co., Cincinnati, Ohio.
Greenfield Tap & Die Corp., Galt, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
Jones & Lamson Machine Co., Springfield, Vermont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Warner & Swasey Co., Cleveland, Ohio.

Screw Machine Products
Torrington Company, Ltd., Upper Bedford, Que.

Screw Plates
Aikenhead Hardware Ltd., Toronto, Ont.
Butterfield & Co., Inc., Rock Island, Que.
Greenfield Tap & Die Corp., Galt, Ont.
Jardine & Co., A. B., Hespeler, Ont.

Screws, Cap and Set
Galt Machine Screw Co., Galt, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
National Acme Co., Cleveland, Ohio.
Torrington Company, Ltd., Upper Bedford, Que.

Screws, Lock Cap
Torrington Company, Ltd., Upper Bedford, Que

Screws, Machine
Barnes Co., Wallace, Bristol, Conn.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Torrington Company, Ltd., Upper Bedford, Que.

Screws, Safety Set
Barnes Co., Wallace, Bristol, Conn.
Galt Machine Screw Co., Galt, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.

Screws, Side Knob
Torrington Company, Ltd., Upper Bedford, Que

Screws, Thumb
Torrington Company, Ltd., Upper Bedford, Que

Second-Hand Machinery
(See Searchlight Section)
Petrie, Ltd., H W., Toronto, Ont.

Separators, Moisture and Oil
Bowser, S. F., & Co., Ltd., Toronto, Can.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

Separators, Oil and Waste
Bowser, S. F., & Co., Ltd., Toronto, Can.

Shafting
Canada Foundries & Forgings Co., Welland, Ont.
Can Drawn Steel Co., Hamilton, Ont.
N S Steel Co., Ltd., New Glasgow, N.S
Williams Machinery Co., A. R., Toronto, Ont.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Shapes, Cold-Drawn Special Steel
Union Drawn Steel Co., Hamilton, Ont.

Shaping Machines
Canada Machinery Corp., Galt, Ont.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Hendey Machine Co., Torrington, Conn.
Herbert Ltd., Alfred, Toronto, Ont.
Holly, B. S., Toronto, Ont.
Morton Mfg Co., Muskegon, Mich.
McDougall Co., Ltd., R., Galt, Ont.
Roelefson Machine & Tool Co., Toronto, Ont.
Smith & Mills Co., Cincinnati, Ohio
Walcott Lathe Co., Jackson, Mich.
Williams Machinery Co., A. R., Toronto, Ont.

Shapers, Wood
Oliver Machinery Co., Grand Rapids, Mich.

Shears, Hand
Can. Blower & Forge Co., Ltd., Kitchener.

Shears, Power
Bliss Co., E. W., Brooklyn, N Y.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Blower & Forge Co., Ltd., Kitchener.
Stall Co., Inc., D H., Buffalo, N Y
Stuart & Co., Duncan, Glasgow, Scot
Toledo Machine & Tool Co., Toledo, Ohio
Williams Machinery Co., A. R., Toronto, Ont.

Shearing Machines, Angle, Iron Bar and Gate
Bertrams Ltd., Edinburgh, Scotland

Sheet Metal Working Machinery
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
Stall Co., Inc., D. H., Buffalo, N.Y.
Terry & Co., John C., Birmingham, Eng
Toledo Machine & Tool Co., Toledo, Ohio.

Sheets, Nickel, Resist, Alloy
International Nickel Co. of Can., Ltd., Toronto, Ont.

Sheets, Nickel, Monel and Fibre
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.

Side Frames, Locomotive
Can. Steel Foundries, Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

Slotting Attachments
Ford-Smith Machine Co., Ltd., Hamilton, Ont
Kearney & Trecker Co., Milwaukee, Wis
Kempsmith Mfg. Co., Milwaukee, Wis.
National Acme Co., Cleveland, Ohio

Slotting Machines
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Solders
British Smelting & Refining Co., Ltd., Montreal, Que.
Hoyt Metal Co., Toronto, Canada.

Snap Flasks
Oliver Machy Co., Grand Rapids, Mich

Special Machinery and Tools
Brown Engineering Corp., Ltd., Toronto.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Crescent Machine Co., Ltd., Montreal, Q.
Ford-Smith Machine Co., Hamilton, Ont
Gisholt Machine Co., Madison, Wis.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
National Acme Co., Cleveland, Ohio.

Specialties, Swaged and Headed Work
Torrington Company, Ltd., Upper Bedford, Que.

Spectacles, Industrial
Willson Goggles, Inc., Reading, Pa.

Springs
Barnes Co., Wallace, Bristol, Conn.
Cleveland Wire Spring Co., Cleveland, O
Dunbar Bros. Co., Bristol, Conn.
Steele Ltd., James, Guelph, Ont

Spring-making Machinery
Sleeper & Hartley, Inc., Worcester, Mass

Sprockets and Chains
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Lyman Tube & Supply Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Renold (Hans) of Canada, Ltd., Montreal, Que.

Squares
Brown & Sharpe Mfg Co., Providence, R I

Stamping, Metal
American Pulley Co., Philadelphia, Pa.
Barnes Co., Wallace, Bristol, Conn
Diamond Saw & Stamping Works, Buffalo, N.Y.
Fisher Motor Co., Ltd., Orillia, Ont.
Keller Pneumatic Tool Co., Grand Haven, Mich
Parmenter & Bulloch Co., Gananoque, Ont.
Tallman Brass & Metal Co., Hamilton, Ont.

Stamps, Steel
Diamond Saw & Stamping Works, Buffalo, N.Y.

Stairways, Wrought Iron
Can. Wire & Iron Goods Co., Hamilton, Ont.

Steam Specialties
Crane Ltd., Montreal, Que

Steel Plate
Dom Foundries & Steel, Hamilton Ont

Steels, Tool
Can Atlas Crucible Steel Co., Toronto, Ont.
Vulcan Crucible Steel Co., Aliquippa, Pa.

Steel Blooms and Billets
Steel Co of Canada, Ltd., Hamilton, Ont

Steel, Cold-Rolled Strip
Andrews Steel Co., Newport, Ky
Barnes Co., Wallace, Bristol, Conn.
Can Driver-Harris Co., Walkerville, Ont
Firth & Sons, Ltd., Thos., Montreal, Q.
Ontario Metal Products Co., Ltd., Toronto, Ont.

Steel Castings
Dom. Foundries & Steel, Hamilton, Ont

Steel Forgings
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

Steel, Shafting and Free Cutting Screw
Barnes Co., Wallace, Bristol, Conn.
Can. Drawn Steel Co., Hamilton, Ont.
Union Drawn Steel Co., Hamilton, Ont.

Steel, Sheet
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Firth & Sons, Ltd., Thos., Montreal, Q
Ontario Metal Products Co., Ltd., Toronto, Ont.
Rice Lewis & Son, Ltd., Toronto, Ont.
Steel Co of Can., Ltd., Hamilton, Ont
Toronto Iron Works, Toronto, Ont.

Steel, Tanks
Can. John Wood Mfg. Co., Toronto, Ont.

Steel, Stainless
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Steel Co. of Can., Ltd., Hamilton, Ont.
Vanadium Alloys Steel, Latrobe, Pa

Steel Wire Rods
Steel Co of Canada, Ltd., Hamilton, Ont

Steels, Alloy, Open Hearth and Electric
United Alloy Steel Corp., Canton, Ohio.

Steels, Alloy and Carbon
Algoma Steel Corp., Ltd., Sault Ste Marie, Ont.
Andrews Steel Co., Newport, Ky.
Armstrong Whitworth Co of Can., Ltd., Montreal, Que.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Barnes Co., Wallace, Bristol, Conn.
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Can Driver-Harris Co., Walkerville, Ont
Can. Steel Foundries, Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Firth & Sons, Ltd., Thos., Montreal, Q.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Ltd., Toronto, Ont.
Steel Co. of Can., Ltd., Hamilton, Ont.
Swedish Crucible Steel Co. of Canada, Ltd., Windsor, Ont.
United Alloy Steel Corp., Canton, Ohio.
Vanadium Alloys Steel, Latrobe, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

Steels, High-Speed
Armstrong Bros. Tool Co., Chicago, Ill
Armstrong Whitworth Co. of Can., Ltd., Montreal, Que.
Atkins & Co., Ltd., Wm., Sheffield, Eng
Baines & David, Ltd., Toronto, Ont.
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Drury Ltd., H. A., Montreal, Que.
Firth & Sons, Ltd., Thos., Montreal, Q.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Ltd., Toronto, Ont.
Steel Co. of Can., Ltd., Hamilton, Ont.
Vanadium Alloys Steel, Latrobe, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

Steel, Magnet
Can. Atlas Crucible Steel Co., Toronto, Ont
Vanadium Alloys Steel, Latrobe, Pa.

Steel, Structural
MacKinnon Steel Co., Sherbrooke, Que.

Steel Tubing, Close Joint and Welded
Standard Tube & Fence Co., Ltd., Woodstock, Ont.

Stern Frames, Cast Steel
Can. Steel Foundries, Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

Straightening Machinery
Bertrams Ltd., Edinburgh, Scotland.

Studs
Galt Machine Screw Co., Galt, Ont

Surface Plates
Bilton Machine Co., Bridgeport, Conn

Swaging Machines
Atkins & Co., Inc., E. C., Indianapolis, I

Switches, Railway
Can. Steel Foundries, Montreal, Que.

Switches and Switchboards
Northern Electric Co., Montreal, Que

Tablets, Bronze, Memorial
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Tachometers
Aikenhead Hardware Ltd., Toronto, Ont
Bristol Co., Waterbury, Conn

Tanks, Steel
MacKinnon Steel Co., Sherbrooke, Que

Tanks and Pumps, Oil
Bowser, S. F., & Co., Ltd., Toronto, Can
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Toronto Iron Works, Toronto, Ont.

Taper Cutting Dies
Jones & Lamson Machine Co., Springfield, Vt

Tap Holders
Greenfield Tap & Die Corp., Galt, Ont
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Taper Pins
Galt Machine Screw Co., Galt, Ont
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Tapes, Measuring
Chesterman & Co., Ltd., J., Sheffield, Eng.
Starrett Co., L. S., Athol, Mass.

Tapping Machines and Attachments
Ackworthie, Ltd., John, Birmingham, Eng
Archibald & Co., Chas. P., Montreal, Q
Burke Machine Tool Co., Conneaut, Ohio
Geometric Tool Co., New Haven, Conn.
Greenfield Tap & Die Corp., Galt, Ont.
Jardine & Co., A. B., Hespeler, Ont.
National Acme Co., Cleveland, Ohio.
Petrie, Ltd., H. W., Toronto, Ont.
Starrett Co., L. S., Athol, Mass.

Taps and Dies
Ackworthie, Ltd., John, Birmingham, Eng.
Butterfield & Co., Inc., Rock Island, Que
Can. Fairbanks-Morse Co., Ltd., Montreal
Geometric Tool Co., New Haven, Conn
Greenfield Tap & Die Corp., Galt, Ont
International Machinery & Supply Co., Montreal, Que.
Jardine & Co., A. B., Hespeler, Ont
Morse Twist Drill & Machine Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Taps, Collapsing
Geometric Tool Co., New Haven, Conn.
Jardine & Co., A. B., Hespeler, Ont
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.

Teeth, Dredge Bucket
Kennedy & Sons, Wm., Owen Sound, Ont.

Testing Metals and Materials
Toronto Testing Laboratory, Toronto, Ont.

Thermometers
Bristol Co., Waterbury, Conn.

Thread-Cutting Tools
Butterfield & Co., Inc., Rock Island, Que
Greenfield Tap & Die Corp., Galt, Ont.
Jones & Lamson Machine Co., Springfield, Vermont.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Victor Tool Co., Waynesboro, Pa.

Thread Cutting Machines
Jones & Lamson Machine Co., Springfield, Vermont.
Landis Machine Co., Inc., Waynesboro, Pa

Threaded Wires
Torrington Company, Ltd., Upper Bedford, Que

Threading Machines
Acme Machinery Co., Cleveland, Ohio.
Geometric Tool Co., New Haven, Conn.
Greenfield Tap & Die Corp., Galt, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Williams Tool Corp. of Can., Ltd., Brantford, Ont.

Thread Lead Testing Machines
Jones & Lamson Machine Co., Springfield, Vt.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Thread-Rolling Machines
Bliss Co., E W., Brooklyn, N Y

Tongs
Hepburn Ltd., John T., Toronto, Ont.

Tool Cases
Rice Lewis & Son, Ltd., Toronto, Ont.

Tool Holders
Armstrong Bros. Tool Co., Chicago, Ill
Bilton Machine Co., Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Williams & Co., J. H., Brooklyn, N Y

Tool Markers, Electric
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

Tool Posts, Lathe
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

Tool Steels for all Purposes
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.

Tools, Small (See Machinists' Small Tools)
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Armstrong Bros Tool Co., Chicago, Ill
Bertrams Ltd., Edinburgh, Scotland.
Burgess & Marchand, Montreal, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal
Chesterman & Co., Ltd., J., Sheffield, Eng
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Geometric Tool Co., New Haven, Conn.
Greenfield Tap & Die Corp., Galt, Ont.
Hamilton Engineering Service, Ltd., Hamilton, Ont.
Keller Pneumatic Tool Co., Grand Haven, Mich.
Kimber & Hillier Mfg. Co., St. Catharines, Ont.
National Machine Tool Co., Racine, Wis
Rapid Tool & Machine Co., Lachine, Que.
Rice Lewis & Son, Ltd., Toronto, Ont.
Rockford Milling Machine Co., Rockford, Ill.
Starrett Co., L. S., Athol, Mass
Strelinger Co. of Can., Ltd., Chas. A. Windsor, Ont.
Wheel Trueing Tool Co., Detroit, Mich.
Williams Machinery Co., A. R., Toronto, Ont.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Tool Work
Brown Engineering Corp., Ltd., Toronto
Crescent Machine Co., Ltd., Montreal, Q.
Ford-Smith Machine Co., Hamilton, Ont

BUYERS' DIRECTORY

Torches, Blow
National Electro Products, Ltd., Toronto Ont.
Perdue W B., San Francisco Calif
Prest-O Lite Co of Can., Toronto Ont
Rice Lewis & Son, Ltd., Toronto, Ont

Trackwork, Railway
Can. Steel Foundries, Montreal, Que

Trackwork, Manganese Steel
Can. Steel Foundries, Montreal, Que

Transformers
Northern Electric Co., Montreal, Que

Transmission Machinery
Bernard Industrial Co., A., Fortierville Que.
Can. Link-Belt Co., Toronto, Ont
Garlock-Walker Mchy. Co., Toronto, Ont
Jones & Glassco, Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont
Petrie, Ltd., H. W., Toronto, Ont.
Positive Clutch & Pulley Works, Toronto, Ont.
Renold (Hans) of Canada, Ltd., Montreal Que.

Transportation Systems (See Trucks)
Mathews Gravity Carrier Co., Port Hope, Ont.

Treated Bits
Can. Atlas Crucible Steel Co., Toronto Ont.
Vanadium Alloys Steel, Latrobe, Pa

Trolleys and Tramways
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont
Wright Mfg Co, Lisbon, Ohio.

Trucks
Can Fairbanks-Morse Ltd, Montreal Q
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.
Hepburn Ltd., John T., Toronto, Ont.
Maple Leaf Mfg. Co., Montreal, Que.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
National Steel Car Corp., Ltd., Hamilton, Ont.

Trucks, Industrial Motor
Maple Leaf Mfg. Co., Montreal, Que.
National Steel Car Corp., Ltd., Hamilton, Ont.

Tube, Products
Tube Co. of Canada, Toronto, Ont.

Tubing, Electric Welded or Oxy-Acetylene Welded
Tube Co. of Canada, Toronto, Ont.

Tubing, Flexible
Dunlop Tire & Rubber Goods Co., Ltd Toronto, Ont.
Goodyear Tire & Rubber Co of Can., Ltd., Toronto, Ont.

Tubing, Seamless Steel
Tube Co. of Canada, Toronto, Ont.

Tubing, Seamless Steel, Brass and Copper and Fibre
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.
Dom. Steel Products Co., Brantford, Ont.
Lyman Tube & Supply Co., Montreal, Que.
Ontario Metal Products Co., Ltd., Toronto, Ont.
Tallman Brass & Metal Co, Hamilton, Ont.

Tubing, Welded
International Nickel Co. of Can., Ltd., Toronto, Ont.
Ontario Metal Products Co., Ltd., Toronto, Ont.

Tubing, Welded Steel
Tube Co. of Canada, Toronto, Ont.

Turbines, Water
Kennedy & Sons, Wm., Owen Sound, Ont.

Turret Heads
Ackworthie, Ltd., John, Birmingham, Eng
Bertram & Son Co., Ltd., The John, Dundas, Ont.

Turret Machines (See Lathes, Horizontal Turret)
Acme Machine Tool Co., Cincinnati, Ohio.
Cook Co., Asa S., Hartford, Conn.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vermont.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Steinle Turret Machine Co., Madison, Wis.
Warner & Swasey Co., Cleveland, Ohio.

Turrets, Tool Post
Gisholt Machine Co., Madison, Wis.

Unions, Pipe
Crane Ltd., Montreal, Que.

Universal Joints
Ford-Smith Machine Co., Hamilton, Ont.
Holden Co., Ltd., Montreal, Que.

Valves
Can. Fairbanks-Morse Ltd., Montreal Q.
Cleveland Pneumatic Tool Co., Toronto, Ont.
Crane Ltd., Montreal, Que.
Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.
Goodyear Tire & Rubber Co. of Can., Ltd., Toronto, Ont.

Vises, Drilling Machine
Hoosier Drilling Mach. Co., Goshen, Ind.
Kempsmith Mfg. Co., Milwaukee, Wis.

Vises, Metal Workers'
Aikenhead Hardware, Ltd., Toronto, Ont.
Columbia Hdwe Division, Cleveland, O

Vises, Milling Machine
Brown & Sharpe Mfg. Co., Providence, R I
Crescent Machine Co., Ltd., Montreal, Q.
Ford-Smith Machine Co., Hamilton, Ont.
Hendey Machine Co., Torrington, Conn.
Hoosier Drilling Mach. Co., Goshen, Ind.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.

Vises, Pipe
Columbia Hdwe. Division, Cleveland, O.
Greenfield Tap & Die Corp., Galt, Ont.

Vises, Planer and Shaper
Bertram & Son Co, Ltd, The John, Dundas, Ont.
Hendey Machine Co., Torrington, Conn.
Hoosier Drilling Mach. Co., Goshen, Ind.
Kempsmith Mfg. Co., Milwaukee, Wis.
McDougall Co., Ltd., R., Galt, Ont.
Superior Machine Co., London, Ont.

Vises, Wood Workers'
Columbia Hdwe. Division, Cleveland, O.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Oliver Machy Co., Grand Rapids, Mich.
Victor Tool Co., Waynesboro, Pa.
Parmenter & Bulloch Co., Gananoque, Ont.

Voltmeters
Bristol Co., Waterbury, Conn.
Northern Electric Co., Montreal, Que

Wagon Loaders
Can. Link-Belt Co., Toronto, Ont.

Washers
Barnes Co., Wallace, Bristol, Conn.
Diamond State Fibre Co., Toronto, Ont.
Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.
Goodyear Tire & Rubber Co. of Can., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
McLaren Belting Co., J. C., Montreal, Que.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Torrington Company, Ltd., Upper Bedford, Que.

Washers, Rubber
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

Welding Apparatus, Oxy-Acetylene
L'Air Liquide Society, Toronto, Ont.

Welding, Electric
All-Weld Company, Toronto, Ont.
Carter Welding Co., Toronto, Ont.
Lincoln Electric Co., Toronto, Ont.
National Electro Products, Toronto, Ont.

Welding Filler Rods
L'Air Liquide Society, Toronto, Ont.
National Electro Products, Ltd., Toronto, Ont.
Perdue, W. B., San Francisco, Calif.
Prest-O-Lite Co. of Can., Toronto, Ont.

Welding Machines, Oxy-Acetylene
Davis-Bournonville Co., Jersey City, N.J.
Holden Co., Ltd., Montreal, Que.
L'Air Liquide Society, Toronto, Ont.
Perdue, W B., San Francisco, Calif
Prest-O-Lite Co. of Can., Toronto, Ont.

Welding, Oxy-Acetylene
Carter Welding Co., Toronto, Ont.
Davis-Bournonville Co., Jersey City, N.J.
Holden Co., Ltd., Montreal, Que.
Lincoln Electric Co., Toronto, Ont.
National Electro Products, Toronto, Ont.
Prest-O-Lite Co. of Can., Toronto, Ont.
Union Carbide Co. of Can., Welland, Ont.

Welding Rod, Tobin, Manganese Bronze and Aluminum
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Welding Supplies
British Smelting & Refining Co., Ltd., Montreal, Que.
Carter Welding Co., Toronto, Ont.
Davis-Bournonville Co., Jersey City, N.J
L'Air Liquide Society, Toronto, Ont.
Lincoln Electric Co., Toronto, Ont.
National Electro Products, Toronto, Ont.
Perdue, W. B., San Francisco, Calif.
Prest-O-Lite Co. of Canada, Ltd., Toronto, Ont.
Union Carbide Co. of Can., Welland, Ont.

Wheels, Cast, Steel
Dominion Foundries & Steel, Ltd., Hamilton, Ont

Wheels, Industrial
American Pulley Co., Philadelphia, Pa.
Hull Iron & Steel Foundries, Hull, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.

Winches, Electric
Shepard Electric Crane & Hoist Co., Montour Falls, N.Y.
Volta Mfg. Co., Welland, Ont.

Winches, Headgate
Kennedy & Sons, Wm., Owen Sound, Ont

Winches, Stoplog
Kennedy & Sons, Wm., Owen Sound, Ont

Wire
Barnes Co., Wallace, Bristol, Conn.
Canada Metal Co., Ltd., Toronto, Ont.
Dennis Wire & Iron Works, London, Ont
Greening Wire Co., B., Hamilton, Ont.
Northern Electric Co., Montreal, Que.

Wire Cloth
Can. Wire & Iron Goods Co., Hamilton, Ont

Wire Coiling Machinery
Sleeper & Hartley, Inc., Worcester, Mass

Wire Rope
Can. Wire & Iron Goods Co., Hamilton, Ont.

Wire Straightening and Cutting Machinery
Baird Machine Co., Bridgeport, Conn.
Brown, Boggs & Co., Ltd., Hamilton, Ont
Schuster Co., F. B., New Haven, Conn
Sleeper & Hartley, Inc., Worcester, Mass.

Wire, Welding
L'Air Liquide Society, Toronto, Ont.
National Electro Products, Ltd., Toronto, Ont.
Perdue, W. B., San Francisco, Calif.
Prest-O-Lite Co. of Can., Toronto, Ont.
Tallman Brass & Metal Co., Hamilton, Ont.

Wires, Special
Dennis Wire & Iron Works, London, Ont
Greening Wire Co., B., Hamilton, Ont
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Woodworking Machinery
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Garlock-Walker Mchy. Co., Toronto, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Williams Machinery Co., A. R., Toronto, Ont.

Wrenches, Drop Forged
Armstrong Bros. Tool Co., Chicago, Ill
Canada Foundries & Forgings Co., Welland, Ont.

Wrenches, Machinists'
Armstrong Bros. Tool Co., Chicago, Ill
Canada Foundries & Forgings Co., Welland, Ont.

Wrenches, Pipe
Canada Foundries & Forgings Co., Welland, Ont.
Crane Ltd., Montreal, Que.
Greenfield Tap & Die Corp., Galt, Ont.

Wrenches, Tap
Butterfield & Co., Inc., Rock Island, Que
Greenfield Tap & Die Corp., Galt, Ont

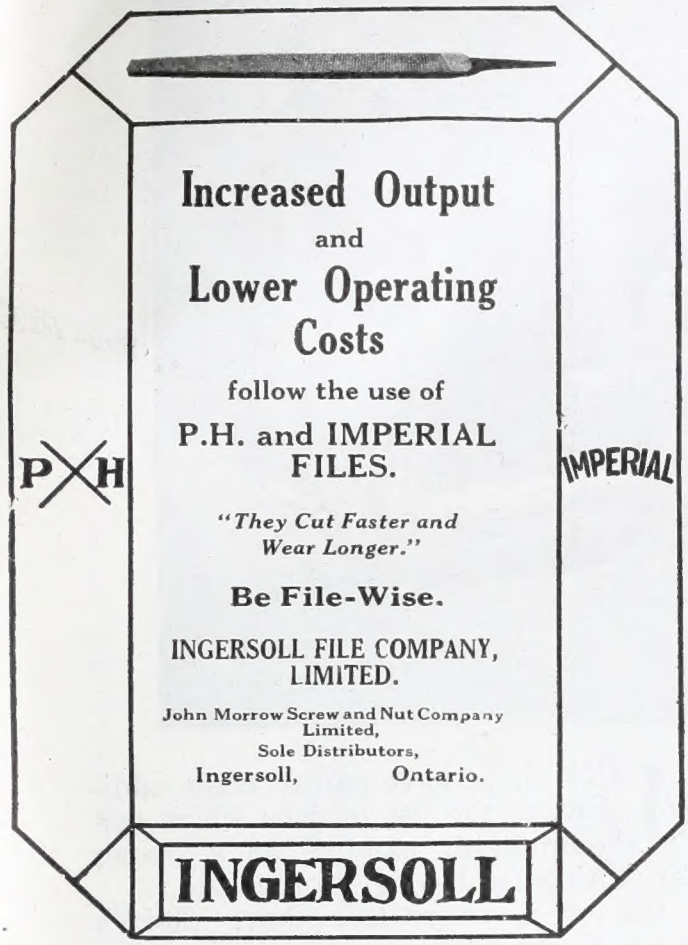
Wrought Iron Pipe
Steel Co of Canada, Ltd, Hamilton, Ont

HŒFER
Drillers and Auxiliary Drilling Heads
Produce exact work in record time.
Send for Catalog and remember that Hoefer Service is yours for the asking
THE HŒFER MFG. CO., FREEPORT, ILL.
Canadian Representatives:
Canadian Fairbanks-Morse Co., Montreal
Branches Throughout Canada 25

Greaves-Etchells Electric Furnace
FURNACES FOR EVERY PURPOSE
Electric Furnace Construction Co.
908 Chestnut Street Phila., Pa.

OILGAS
INDUSTRIAL FURNACES
Most modern, efficient and economical heating method. Made in Canada! Full details on request.
General Combustion Co. of Canada, Limited
619-623 New Birks Building, Montreal

MORTON MANUFACTURING COMPANY
Muskegon Heights, Mich., U.S.A.
Heavy Duty Draw Cut Shapers, Special Heavy Duty Draw Cut B.R. Shapers, Special Locomotive Cylinder Planers, Traveling Head Planers, Special Roll Wobble Planers, Portable Planers, Stationary and Portable Keyway Cutters, Finished Machine Keys. See our full page advertisement in the first issue each month of "Canadian Machinery."



THE DENNIS WIRE AND IRON WORKS CO. LIMITED
LONDON CANADA.
IRON STAIRS, MARQUISES, ELEVATOR ENCLOSURES, GRILLES FIRE ESCAPES AND WIRE WORK GATES, RAILINGS, LAMPS ETC.
STEEL LOCKERS, CABINETS, SHELVING, ETC

INDEX TO ADVERTISERS

A

Ackworthie Ltd., John 12
Algoma Steel Corporation ... 4
Armstrong Bros. Tool Co. 10
Atkins & Co., E. C. 55
Atkins & Co., Wm. 10
Aurora Tool Works 16

B

Bertram & Sons Co., John 1
Bertrams, Limited 57
Brantford Oven & Rack Co. .. 57
Bristol Company 57
Browne & Sharpe Mfg. Co. ... 22
Burgess & Marchand 16
Bowser & Co., S. F. 2
Bilton Machine Tool Co..... 12
Butterfield & Co.....Front cover

C

Canada Foundries & Forgings Ltd. 61
Canada Machinery Corporation Outside back cover
Canada Metal Co. 7
Can. Allis-Chalmers Co., Ltd. . 59
Canada Atlas Crucible Steel Co. 10
Can. Drawn Steel Co. 60
Can. Driver-Harris Co. 14, 15
Can. Fairbanks-Morse Co. 24
Can. Steel Foundries 9
Classified Advertising 58, 59
Crane Limited 18
Crescent Machine Co. 15

D

Darling Bros., Ltd. 14
Davidson Mfg. Co., Thos. 61
Davis-Bournonville Co. 15
Dennis Wire & Iron Works.... 71
Dom. Forge & Stamping Co... 61
Dom. Foundries & Steel, Ltd. . 9
Dom. Steel Products, Ltd. 57

E

Electric Furnace Construction Co. 70
Elk Firebrick Co. 6

F

Fellows Gear Shaper Co. 14
Fetherstonhaugh & Co. 57
Fisher Motor Co. 14
Fittings Limited 14
Frost Mfg. Co., G. 16

G

Galt Machine Screw Co. 13
Garlock-Walker Machinery Co. 59
General Combustion Co., Ltd. . 70
Geometric Tool Co. 53
Gisholt Machine Co. 23

H

Hamilton Eng'ng Service, Ltd. 56
Hamilton Gear & Mach. Co. ... 61
Hamilton Motor Works, Ltd. .. 16
Hanna & Co., M. A. 2
Hendey Machine Co. 72
Henry & Wright Mfg. Co. 3
Hepburn Ltd., John T. 2
Hoefer Mfg. Co. 70
Hoyt Metal Company 3
Holly, R. S. 59
Hughes, Owen Co., Ltd. 14

I

Ingersoll File Co. 71

J

Johnson Machine Co., Carlyle. 8
Jardine & Co., A. B. 13
Joyce-Koebel Co. 60

K

Kearney & Trecker Corp. .... Inside back cover
Keller Pneumatic Tool Co. 60
Kennedy & Sons, Wm. 11
Kimber & Hillier 56

L

Landis Tool Co. 7
La Salle Tool Co. 7

M

Manitoba Steel Foundries, Ltd. 15
McDougall Co., Ltd., R. 21
McLaren Belting Co., J. C.... 60
Mechanical Engineering Co. ... 14
Mechanical Publications 62
Miller Bros. & Sons, Ltd..... 15
Morrow Screw & Nut Co., John 7
Morse Chain Co..... 14
Morton Mfg. Co. 70

N

National Acme Co. 19
Nicholson File Co. 6
Niles-Bement-Pond ..... Inside front cover
Northern Crane Works 16
Norton, A. O. 15
Nova Scotia Steel & Coal Co.. 11

O

Oakley Chemical Co. 61

P

Parmenter, Bulloch Co..... 15
Petrie, Ltd., W. H. 5
Philadelphia Gear Works 61
Pilot Steel Tool Co. 3
Pratt & Whitney..Inside front cover
Puro Sanitary Drinking Fountain Co. 56

R

Rice Lewis & Son 21
Roelofson Mach. & Tool Co... 17
Rockford Drilling Machine Co. 16
Rockford Milling Machine Co. 8
Rockwell Co., W. S. 60

S

Selson Engineering Co. 13
Sheffield Engineering Supplies. 15
Shepard Electric Crane & Hoist Co. 14
Shuster Co., F. B. 16
Skinner Chuck Co. 15
Smooth-On Mfg. Co. 6
Starrett Co., L. S. 20
Steinle Turret Machine Co. ... 16
Stoll Co., D. H. 15

T

Trahern Pump Co. 11

U

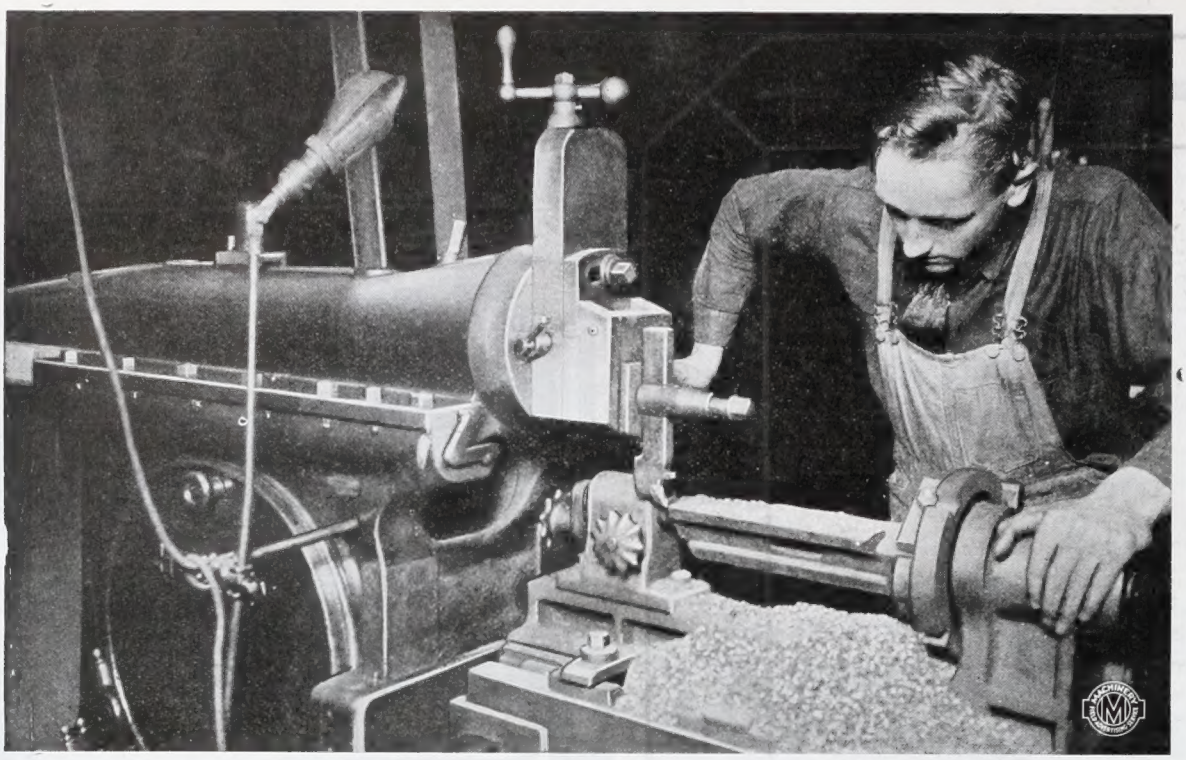
Union Mfg. Co. 14
United States Electrical Tool Co. 12

V

Victoria Foundry Co. 14

W

Wheel Trueing Tool Co. 15
Whiton Co., D. E. 15
Williams Machinery Co., A. R. 51



Extending the Range of Work a Shaper Can Handle

MANY shops have had to make additions to the list of jobs which can be profitably handled on a shaper after putting the Hendey to the test.

In the plant where the above 20-inch Hendey Crank Shaper, and another just like it, are working, the problem of handling small lots of various shapes and sizes has been solved. Instead of going to the expense of special cutters and jigs for machining small odd lots by other methods, these jobs are run through on the versatile Hendey without trouble.

When considering the merits of Hendey Shapers, bear in mind their reputation for solving production problems, for cutting costs and for increasing output.

The Hendey Machine Company

Torrington, Conn., U.S.A.

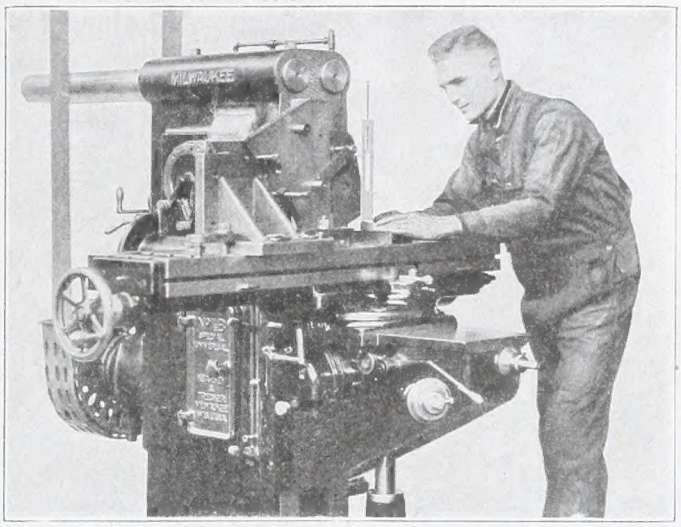
Canadian Agents:

A. R. Williams Machinery Co., Vancouver
A. R. Williams Machinery Co., Toronto
A. R. Williams Machinery Co., St. John, N.B.
A. R. Williams Machinery Co., 260 Princess St., Winnipeg
Williams & Wilson, Montreal

HENDEY

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

MILWAUKEE MILLING MACHINES



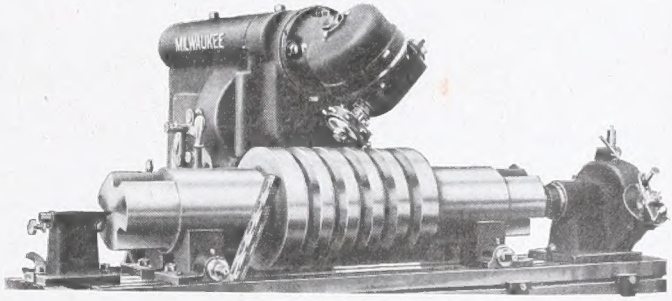
Efficient on Light and Heavy Milling

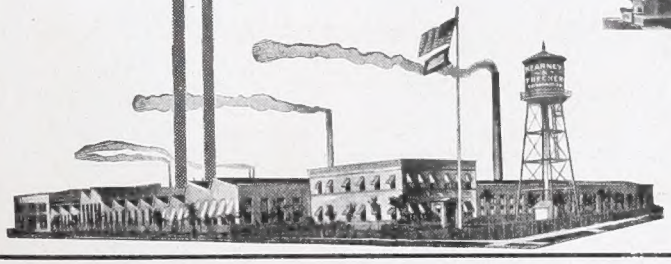
Heavy milling jobs are not unknown to Milwaukee Universal Milling Machines, while delicate and intricate ones are efficiently performed with little effort.

Both light and heavy milling operations are handled with such smoothness and accuracy that the finest results are obtained. Because Milwaukee Universal Milling Machines perform such a wide variety of work, they are particularly well adapted for the tool-room.

The jobs shown in the two illustrations are representative of "Milwaukee" adaptability. The upper illustration shows a jig being bored with a fly cutter. The lower illustrates the milling of a chilled roll with the use of a Universal Milling Attachment.

Write for Catalogue—NOW.





KEARNEY & TRECKER
CORPORATION
MILWAUKEE, WIS., U.S.A.

Canadian Representatives: Williams and Wilson, Ltd., Montreal; F. F. Barber Machy. Co., Toronto; A. R. Williams Machy. Co., Vancouver and Winnipeg.

C.M.C.

Iron and Woodworking Machinery

ANNOUNCEMENT

OUR Toronto Sales Staff are now located in offices in BANK OF HAMILTON BUILDING, Rooms 721-722, where they will be glad to see our Customers or have them communicate by telephone Number Main 475.

All inquiries will receive prompt and careful attention

CANADA MACHINERY CORPORATION
LIMITED

Galt - Ontario

Toronto Sales Office, 721 Bank of Hamilton Bldg.